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BIRD-BANDING

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A STUDY OF WINTERING HOARY, COMMON, AND GREATER REDPOLLS, AND VARIOUS INTERMEDIATES OR HYBRIDS

By OLIVE PIKE WETHERBEE[1]

GENERAL STATUS. The Common Redpoll (*Acanthis linaria linaria*) is a rather irregular winter visitant in southern New England, being apparently entirely absent some winters, then appearing in fairly abundant numbers for a winter or two. Its somewhat erratic movements can doubtless be traced to the food-supply, wandering, as it does, southward and remaining wherever seeds to its liking are plentiful.

The Hoary Redpoll (*Acanthis hornemanni exilipes*) and the Greater Redpoll (*Acanthis linaria rostrata*) occur rarely in southern New England. Some few specimens of the Greater Redpoll have been taken in Massachusetts[1] and Connecticut[2], and more rarely have specimens of the Hoary Redpoll been taken.[3] Even sight records of these Redpolls are exceedingly rare, as it is only under favorable circumstances that they can be distinguished from the Common Redpolls. A recent survey of field reports at the Worcester Museum of Natural History revealed only one sight record for the rarer Redpolls for Worcester County during the past twenty-five years—a Greater Redpoll, seen with a flock of Common Redpolls on February 3d, 1914, by A. J. Green, a Worcester taxidermist.

Influx of 1935–36. During the winter of 1919–20 Common Redpolls were frequently seen. Since that time there has been a marked scarcity until the past winter, 1935–36, when they occurred in positive abundance. The unusual influx may have been due to the unprecedentedly severe winter, for 44.8 inches of snow fell during the period from January 1st to March 15th, and two months of frigid weather was broken only by a week's thaw the latter part of February. The mean temperature for the latter half of January was 17.6 degrees; that for February was 19 degrees, 5.6 degrees below the normal February mean temperature.

[1] Mrs. Kenneth B. Wetherbee.

The first Redpoll of the season seen in Worcester County was a single individual which rested for a moment only on a small pear tree at my banding station on November 15th. At that time it was considered quite a rarity. Its dark chin patch and red cap were clearly seen through 8-power binoculars at a distance of fifty feet. No other Redpolls were seen until the latter part of December, when approximately twenty-five Common Redpolls were startled from an alder thicket in a swamp about a quarter of a mile north of the same banding station. During the remainder of the winter, flocks of Redpolls were reported from all sections of the county, and it finally became known that their visitation was somewhat general throughout New England. Larger unidentified birds were frequently reported feeding with the Redpolls. The only authentic records of the rarer kinds, however, were one Hoary and one Greater Redpoll among some thirty Redpolls banded by Lloyd S. Jenkins, of 10 Ashmore Road, Worcester, and one skin of the Greater Redpoll made up and presented by him to the Worcester Museum of Natural History.

As the weather became more severe and the heavy snowfall crusted over, the flocks congregated near the houses, and on the first day of February two Common Redpolls ventured into my banding traps. Others drifted in gradually until the flock numbered about 110, though rarely could more than fifty be seen at one time. When the snow melted, the size of the flock diminished, the last ones leaving us on the 24th of March.

Food Preferences. Under natural conditions here in New England, Redpolls seem to prefer seeds of the gray birch (*Betula populifolia*) but they also eat seeds of alder (*Alnus incana*) and tamarack (*Larix laricina*) and, perhaps less frequently, weed seeds of various kinds. In their new environment at the banding station their choice of food was determined by placing the first ones captured in a cage containing a mixture of cracked corn, oats, barley, chickfeed, millet, buckwheat, hemp, and sunflower seeds. They immediately proceeded to pick out all the millet. When the millet was gone, they refused to eat for a full hour, then a fresh supply of the same mixture was offered them, and they again fed greedily on the millet alone. If the mixture had contained canary and hay seeds, undoubtedly those seeds would have been eaten also, as both were readily taken at other feeding stations.

Banding Records. During their seven weeks' stay 120 Redpolls were banded, including 6 Hoary, 69 Common, 32 Greater, and 13 individuals intermediate between Greater and Common Redpolls. All were captured at my banding station except 13 individuals that were taken at the home of Mr. and Mrs. Alvin Newman in North Brookfield, Massachusetts, at whose feeding station two loiterers remained until April 19th.

Location of Banding Station. My banding station in Worcester, Massachusetts, is located on the extreme eastern limits of the city, in a section built up comparatively recently to cottage houses. Approximately five hundred feet to the west, running north and south, are the tracks of the Boston and Albany Railroad, the high banks of which afford some shelter to the birds, especially in the swamps north and south of the banding station. The principal trees in the swamps are maples, birches, and alders, interspersed with smaller growth of elder, burdocks, evening primroses, and other weeds. Lake Park lies two blocks to the east on the west shore of Lake Quinsigamond. It contains several acres of open woodland and a pine grove. Our house at 11 Dallas Street is situated on a corner lot of seventy-five by one hundred feet. Woodrow and Dallas Streets are lined with cut-leaf maple and Carolina poplar trees of about twenty years' growth. There are several small fruit trees on this and adjoining property and lawn and garden plots with a few shrubs. A space thirty by forty feet on the easterly side of the house is sown to millet, hemp, and sunflower. All trapping during the winter is carried on in this area. The only trap in operation at the time the Redpolls arrived was a large elevated tray trap of the pull-string type built beneath a winter shelter. Small two-compartment Potter-type traps of vertical wire were immediately placed under the shelter to capture those birds preferring to feed on the ground.

Method of Study. Each bird banded was carefully measured and weighed, its plumage studied and exact colors recorded with the aid of Ridgway's "Color Standards and Nomenclature." Pertinent notes concerning behavior, voice, and other peculiarities of each individual were recorded in a small notebook.

General Behavior. Each morning at the first hint of dawn the Redpolls appeared at the banding station and remained in a small cherry tree until it was light enough to begin feeding. Some few remained all day, small flocks coming and going. Just as long as it was possible for them to see the seeds before them they ate ravenously, then at dusk, when it was so dark that we could barely see them go, they gathered in the cherry tree and from there invariably flew east, apparently to the pine grove for the night.

The Redpolls regarded humans with little interest. They were alarmed only by a sudden movement. By moving cautiously one could approach to within a few inches of them as they fed, and they were but mildly concerned when a hand moved slowly about among them. A springing trap sometimes startled them for a moment, but they invariably immediately returned to the feed. Their tameness made them easy prey for prowling cats, and although a sling-shot was kept constantly at hand, it became necessary to place the seeds only in the elevated tray and on a windowshelf upon which two small traps were set. As a rule they

fed peacefully, packed as closely as they could stand on the shelf, though occasionally one would open its bill in an unfriendly attitude toward a newcomer attempting to alight on that portion of the tray which the first arrival evidently considered its own particular property. They also associated agreeably with Purple Finches and Tree Sparrows.

Voice. As they fed they kept up a perpetual twittering similar to that of Goldfinches, but having a more rattling quality. At times one gave a plaintive canary-like call, which resembled the *swe-eet* call of the Goldfinch, but it was slightly more sharp and of longer duration. This call seemed to serve two purposes, those of a danger signal and a call to food. It was uttered with peculiar emphasis when there was a cat about, but was most frequently heard early in the morning while the flock was congregating in the cherry tree before starting to feed, at which time it was voiced by many members of the flock in a more rollicking manner. At dusk, when they were gathering to leave, or at odd times during the day when a few individuals left the station for a while, they delivered a few rapid notes very much like the *per-chic-o-pee* call of the Goldfinch, before flying away. This was in all probability a flocking call, for only those birds gathering to go elsewhere appeared to give it, the remaining birds paying not the slightest attention.

The calls of the Greater Redpolls were louder and more harsh, and it was always possible to tell by their twittering alone whether one or both kinds were on the shelf. The Greater Redpolls often emitted an additional call while being removed from the gathering cage, resembling nothing more closely than the sharp *whe-eep* of the Hermit Thrush. Notes of the Hoary Redpoll are said to be more sharp than those of the Common Redpoll, but although sharp notes were sometimes heard, it was never possible to segregate the individual giving the distinctive Hoary Redpoll call. They all voiced incessant *chee-chee-chees* while awing, and were in reality never quiet excepting when they sensed danger. Then they stopped feeding and there was a breathless silence, usually followed by a sudden rising of the whole flock, as that of a single bird.

Arrival of Rarer Kinds. The Common Redpolls were continually at the station from February 1st, but it was not until February 18th that a number of Greater, some few Hoary, and various intermediate Redpolls arrived, during a raging blizzard. Since it was feared that they might leave as unexpectly as they had come, hand capturing was attempted. The window was slowly raised, and a hand, reached cautiously out, was carefully cupped about the desired individual, which was brought slowly inside without unduly disturbing its companions. Many unbanded Redpolls were taken in like manner on this and subsequent days. If an individual displayed some nervousness, instead of attempting to capture it by hand, I gently shoved it toward a trap entrance.

Color of Bills of All Kinds. The bills of all kinds of Redpolls examined were yellow to dusky or orange with dusky tip and edgings, and less frequently dusky on ridge both above and below, varying considerably in separate individuals.

Discriminative Characteristics of the Hoary Redpolls. The lighter-colored plumage, especially the mouse-gray loral streak, chin, and nasal tufts, the white rump, broad white edgings of the wing coverts, and white inner webs of the secondaries, forming a light patch on the closed wing, readily distinguished the Hoary from the Common Redpolls, though as the season progressed it became increasingly difficult to separate the two kinds in the field because the railroad and city smoke darkened the feathers unbelievably. Tree Sparrows wintering in the same region were nearly a uniform dark gray.

A comparison of the measurements of the Hoary and Common Redpolls in the accompanying table (Table I) shows slight variation in length. However, the body of the Hoary is noticeably smaller than that of the Common Redpoll, a fact not realized until the two kinds are handled, for the plumage of the Hoary is more fluffy. Their nearly equal length is accounted for by the uniformly longer tail of the Hoary Redpoll. Proof of the smaller body is borne out by the lighter weights (Table I). In spite of statements to the contrary, the bill of the Hoary appeared to be more acute than that of the Common, and in reality it was so, at least in the few specimens that were handled, for though the average length of the culmen was only slightly shorter, the depth was markedly less.

Plumage of Hoary Redpolls. Four of the six Hoary Redpolls were males, two having rosy cheeks, breasts, and rumps; the rosy color of the third extended to the bend of the wing, and the fourth was the most highly colored, having its flanks and under tail-coverts suffused with pink. One of the two supposedly female Hoary Redpolls possessed a rosy rump; the other was recorded as having a rosy tinge on cheeks and rump. Only one of the six was found to have under tail-coverts entirely unmarked, this being the most rosy of the males. Under tail-coverts of the remaining five were sparingly streaked, in some cases streaking being restricted to the two or three longer feathers.

The dark areas of the wings and tail of the Hoary Redpolls were hair brown, the back was light drab mixed with whitish, the breast and belly white to smoke gray, the nasal tufts, lores, and chin-spot drab to mouse gray. The spot on top of the head was oxblood red, glowing carmine in the sunshine, with the exception of one female that had a bronzy-colored cap. The breasts, cheeks and rumps of the males were eosine pink, but one male had a bronzy wash on the left side of the breast. Forehead and cheeks were sometimes tipped with white, exhibiting a somewhat frosted appearance.

Plumage of Common Redpolls. The dark areas of the wings and tail

TABLE I

Species	Number of Individuals	Length	Wing	Tail	Exposed Culmen	Depth of Bill	Tarsus	Diameter of Eye	Weight in Grams
Hoary	6	121.00–127.50 (124.42)	71.50–75.00 (73.17)	56.00–58.50 (57.50)	8.00–9.00 (8.42)	5.50–6.00 (5.92)	13.00–15.00 (14.25)	2.50–2.75 (2.62)	10.70–14.20 (12.29)
Common	69	118.00–132.00 (125.52)	68.50–77.00 (72.93)	49.50–61.00 (55.71)	7.00–9.50 (8.45)	5.50–8.00 (6.71)	13.00–16.00 (14.40)	2.75–3.00 (2.88)	11.50–16.40 (14.05)
Intermediates (between Greater and Common)	13	124.00–132.00 (129.00)	71.50–76.50 (74.31)	52.50–64.00 (57.81)	7.75–9.00 (8.45)	6.50–7.00 (6.73)	13.00–15.00 (14.50)	3	13.40–16.40 (15.24)
Greater	32	131.00–141.50 (135.97)	72.00–84.00 (78.47)	54.50–66.00 (61.41)	8.00–9.50 (8.95)	6.50–8.00 (7.15)	14.00–18.00 (15.93)	3.00–3.50 (3.25)	15.60–20.00 (18.06)

TABLE II

	Dark Areas, Including Rectrices, Remiges, and Streaking on Back and Sides	General Color of Back	Under Parts, Including Breast and Belly of Females, and Areas Not Rosy in Males	Nasal Tufts and Chin-Patch	Spot on Top of Head	Breast of Males	Cheeks of Males	Rump of Males	Edgings of Wing-Coverts	Shape and Color of Bill
Hoary Redpoll	Hair brown	Light drab, mixed with hair brown and white	White to smoke gray	Drab to mouse gray	Oxblood red glowing carmine in sunshine (exception: one with bronzy-colored cap)	Eosine pink	White tipped mixed with eosine pink	Eosine pink	White (broad)	Acute (straight outlines). Yellow, tipped and edged with dusky
Common Redpoll	Fuscous	Hair brown to light drab mixed with white and fuscous, varying greatly, feathers often buffy-edged	Smoke gray	Fuscous to grayish olive	Victoria lake to nopal red, glistening spectrum red to scarlet in sun (exceptions: 2 with bronzy-colored caps)	Begonia rose rarely paling to eosine pink and shrimp pink	Begonia rose to rose doree (exception: one with carmine)	Shrimp pink, eosine pink and begonia rose	Light gray (more narrow than hoary)	Acute (straight outlines). Yellow, tipped and edged with dusky
Greater Redpoll	Chaetura black	Hair brown and buff mixed with chaetura black	Smoke gray (sometimes buffy-edged) tail-coverts and flanks smoke gray heavily streaked	Hair brown	Oxblood red glistening nopal red through garnet brown and carmine to Brazil red-orange rufous and burnt sienna-salmon orange	Smoke gray in rare cases slightly washed eosine pink	Smoke gray and hair brown (cheeks in one case slightly washed eosine pink)	Smoke gray and hair brown (in 2 cases slightly washed eosine pink)	Very narrowly edged gray	Convex, conic, bulging. Yellow to dusky, tipped and ridged with dusky (exception: one with orange bill)

of the Common Redpolls were fuscous, back hair brown to light drab, mixed with white and fuscous, varying greatly, feathers often being buffy edged. Breast and belly of females were smoke gray, nasal tufts and chin-spot fuscous to grayish olive. The spot on top of the head ranged from victoria lake to nopal red, and in the sunshine glistened spectrum red to scarlet. Two individuals had bronzy-colored heads. The throat and cheeks of most males were begonia rose to rose dorée, but one had a throat of carmine. The breast was most often begonia rose, rarely paling to eosine pink and shrimp pink. The most common rump recorded was shrimp pink, others were eosine pink and begonia rose. Only 17 of the 69 Common Redpolls had rosy breasts and were on that account called males. Undoubtedly many with rosy cheeks and rumps were young males.

Distinctive Characteristics of Greater Redpolls. The large size and dark coloration of the Greater Redpolls quickly set them apart from all other kinds. Additional distinctive characteristics were their bulging bills and upright posture, so different from the others with bills of straight outlines and postures somewhat crouching. As they stood on the shelf they appeared to be more than twice the size of the others.

Plumage of Greater Redpolls. The dark areas of the Greater Redpolls, that is, wing and tail feathers and also streaking of sides and tail-coverts, were chætura black, the breast feathers were smoke gray, in several cases buffy-edged. Feathers of the back were mixed hair brown and buff, chin and nasal tufts, hair brown. Flanks and tail-coverts were smoke gray, heavily streaked. The greater and middle coverts were very narrowly edged with gray. The spot on top of the head of the Greater was much smaller than that of the other Redpolls, and the color was more inclined to the orange shades, ranging from oxblood red which glistened nopal red in the sun, through varying shades of garnet brown and carmine to the two most peculiarly colored individuals, one with a spot of Brazil red overcast orange rufous, the other having a spot of burnt sienna, glowing salmon orange in the sun. Three of the 32 Greater Redpolls showed some rosy coloring elsewhere than on the head. One was recorded as having the breast slightly washed eosine pink, one had a rosy tinge on the rump, and a third, the most highly colored of the group, had a rosy tinge on cheeks, breast, and rump. Apparently males do not attain the rosy coloring until the first postnuptial molt, or perhaps some individuals never do. The above-mentioned skin in the Worcester Museum of Natural History is that of a male but shows no trace of rosy plumage except the red cap.

NOTES ON INDIVIDUALS INTERMEDIATE BETWEEN GREATER AND COMMON REDPOLLS

The 13 intermediates represented the most interesting group, as no two were alike. To prove their hybridism, the peculiarities of each individual are presented in the following records from my notebook: No. 1: Size and weight leaning toward Greater, shape of bill and general coloration more like Common. No. 2: Larger than Common, smaller than Greater, weight of Common, bill conic but too small for typical Greater. No. 3: Length of Common, weight of Greater, color of Greater, bill of shape of Common. No. 4: Length of Common, weight of Greater, bill conic, though small, color more like Greater. No. 5: Length and weight of large Common, bill conic, general color intermediate between the two. No. 6: Length of Common, weight intermediate, bill quite conic, color intermediate, suffusion of color, always lacking in Greater, dark remiges and rectrices narrowly edged like Greater. No. 7: Length of Common, weight of Greater, bill, shape of Common though short, color intermediate. No. 8: Length and weight of Greater, bill and color intermediate. No. 9: Length, weight, and color intermediate, leaning toward Greater, bill of Common. No. 10. Length, weight, and color intermediate, bill quite conic but too narrow for Greater. No. 11: Length decidedly of Common weight of Greater, color of Greater, bill intermediate. No. 12: Length and weight intermediate, bill shape of Common, color intermediate, leaning toward Greater. No. 13: Length of Greater, though wing-length of Common, weight and bill intermediate, great suffusion of color absent in Greater, garnet brown head peculiar to Greater, never to Common. Only five of the group possessed the rosy plumage of the male. Because of their distinctive peculiarities all were readily classed as intermediates between Greater and Common Redpolls.

Various Groups of Intergrades. Group 1.—Among the 69 Common Redpolls were four abnormal individuals which were apparently intergrades as the following notes suggest: No. 1: Length of Common, weight and plumage of intermediate, heavier and darker than typical Common. No. 2: Length and weight of Common, plumage dark and posture upright, as in intermediate. No. 3: Length and color of Common, weight and bill of intermediate. No. 4: Length and shape of intermediate, color and weight of Common. Each displayed some characteristic not typical of true Common Redpolls, and suggested an intergradation of the Common and intermediate kinds.

Group 2.—There were nine individuals that showed hybridism between Hoary and Common Redpolls. They generally had lighter-colored rumps, smaller bodies, longer tails, narrower bills, remiges more broadly edged than typical Common Redpolls, but not one displayed the light coloration peculiar to the Hoary Redpolls.

Group 3.—Three seemed to be intergrades between the intermediate group and Hoary Redpolls. Two of these were even too large to be Common, but had light rumps and practically unstreaked under tail-coverts. The third was an extremely small-bodied bird with the narrow edgings of remiges characteristic of the intermediate group.

These three groups have been classed with the Common Redpolls, as well as several small-bodied birds which displayed no characteristics of the Hoary other than size, and were therefore assumed to be Common females. The fact that these irregular intergrades were placed in the Common class accounts for the wide variation of color, and also of measurements and weights given in the accompanying table (Table 1).

Comparisons of Skins with Living Birds. I am deeply indebted to Mr. James L. Peters for a survey of the entire series of Redpoll skins at the Museum of Comparative Zoölogy in Cambridge. We found that all measurements of skins conformed with those of my living birds. Colors coincided, with the sole exception of darkened feathers of the living specimens which were soiled by city smoke. An examination of skins of the Greater Redpoll revealed a low percentage of rosy males, which agreed with that of living birds studied. Although the rosy plumage of the breast, at least, is not acquired until the first postnuptial molt,[4] the number of rosy males present still seems very small, and Mr. Peters has suggested that adult males may migrate to a lesser degree than females and young, which would be an additional factor in accounting for their scarcity.

The North American skins erroneously labeled Holboell's Redpoll were inspected, and all were readily allotted to the various classes of intermediates; none possessed the very long and narrow bill peculiar to the true Holboell's Redpoll.[5]

Additional Records of Rarer Kinds. Additional specimens of the rarer kinds taken in Massachusetts are the following skins in the Thayer Collection: one "*holbœlli*" not sexed but female by plumage, Lexington, Massachusetts, March 10, 1890, of which the measurements are: wing, 72 mm., tail 68.5, culmen 8.9, depth of bill 5.8, six *rostrata* (unquestionably) taken at Newton, Massachusetts, 1896, consisting of a female February 11th, female March 4th, adult male and immature male March 6th, two females March 9th.

Summary. Weather conditions and food-supply obviously influenced presence and irregularity of wintering Redpolls. When their supply of natural food was exhausted or nearly so, they quickly became accustomed to unnatural conditions presented by feeding stations, where their ravenous appetites were satisfied mainly by millet, grass, and canary seeds. They exhibited little fear of man, and in these unnatural surroundings easily and all too frequently fell prey to the ubiquitous cat. A safe feeding place offered an excellent opportunity for study of the living bird. Capturing the birds

both by traps and by hand effected a thorough and systematic study of each individual bird. Their distinctive social flocking habits, if somewhat erratic, their calls of unceasingly pleasant notes, and their plumages of varying shades and brilliance, not to mention the very dearth of rarer kinds recorded, all combined to make their study a most fascinating objective.

The Hoary Redpoll can readily be called the rarest of all kinds studied. In "The Birds of Minnesota,"[6] the Hoary Redpoll is described as "the largest and lightest colored of the Redpolls." This misleading description would do very well for the Greenland Redpoll (*Acanthis hornemanni hornemanni*), a specimen of which has recently been taken in Michigan.[7] Barring the Greenland Redpoll, the Hoary is the lightest-colored, but in size it ranks smallest, being of lighter weight than the Common Redpoll. Some large individuals of the Hoary approach the Common in length, owing to their longer tails. Their fluffy plumage often belies their diminutive size.

The Greater Redpoll possesses characteristics of a more outstanding quality than any of the other kinds studied. Its size, coloration, voice, posture, and shape, particularly the shape of the bill, emphatically place it in a class by itself. Then, too, its general behavior in the field is more typically that of the larger finches than of the smaller Redpolls. Intermediates between Greater and Common, also intergrades of somewhat questionable parentage, cause confusion and tend to make field identification unreliable.

Apparently intermediates between the Greenland and Greater Redpolls have never been taken, though both spend the breeding season in Greenland. A systematic study, particularly by banders of the Middle West, where the Greenland Redpoll occasionally occurs, might reveal such an intergradation.

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[2] Bishop, L. B.: *The Auk*, Vol. XVIII, 1901, p. 195.

[3] Brewster, William: *The Auk*, Vol. IV, 1887, p. 163; Howe and Allen, pp. 129, 130; and Bishop, L. B.: *The Auk*, Vol. XXVII, 1910, p. 463.

[4] Dwight, Jonathan, Jr.: The Sequence of Plumages and Moults of the Passerine Birds of New York. *Annals New York Academy of Science*, Vol. XIII, No. 1, 1900, p. 178.

[5] Note: The two specimens of *"holboellii"* taken by William Brewster in 1883 have not been accessible to me for examination.

[6] Roberts, T. S.: The Birds of Minnesota, p. 702.

[7] Bryens, O. M.: *The Auk*, Vol. LII, 1935, p. 95.

RESULTS FROM BANDING EUROPEAN CORMORANTS

By HARRISON F. LEWIS[1]

EUROPEAN CORMORANTS (*Phalacrocorax carbo carbo*) have been banded in North America only at two breeding colonies on the north shore of the Gulf of St. Lawrence, in the Province of Quebec, Canada. One of these colonies, originally situated entirely on Lake Island, near Cape Whittle, has recently spread to one of the Outer Wapitagun Islands, in the immediate vicinity. The other colony, situated on Cliff Island, in St. Mary Islands Bird Sanctuary, about twenty miles northeast of Cape Whittle, came into existence only in 1930.[2]

All of the birds banded in these colonies were banded as nestlings. The following table shows when and where the banding was done.

RECORD OF BANDING OF EUROPEAN CORMORANTS

Year	*Lake Island*	*St. Mary Islands*	*Total*
1923	3	....	3
1924	....	....	....
1925	....	....	....
1926	24	....	24
1927	11	....	11
1928	7	....	7
1929	4	....	4
1930	49	....	49
1931	23	....	23
1932	73	....	73
1933	112	16	128
1934	121	39	160
1935	63	....	63
1936	17	23	40
	507	78	585

The total number banded up to the end of 1935 and consequently available to produce recovery records for use in this report is 545. The number of recovery records obtained from these birds, apart from two or three possible records that are considered unavailable because of uncertainty, is 65, or 11.93 per cent of the number banded.

Thirty-one recoveries, or 5.69 per cent of the available banded birds, were reported in the first autumn after banding. Fifteen recoveries, or 2.75 per cent of the available banded birds, were reported in the first winter after banding. Three recoveries, or .55 per cent of the available banded birds, were reported in the first spring after banding. The total of these three items is forty-

[1] The author is Chief Federal Migratory Bird Officer for Ontario and Quebec, Department of Mines and Resources, Canada.

[2] See *The Canadian Field-Naturalist*, 48:100.

nine recoveries, or 8.99 per cent of the available banded birds, reported prior to the first of June of the year subsequent to hatching.

European Cormorants which might possibly have produced, for inclusion in this report, recovery records in their second year, arbitrarily reckoned as beginning on the first of June, are only those banded prior to 1935, the total of which is 482. There are only twelve second-year recoveries, forming 2.49 per cent of this total.

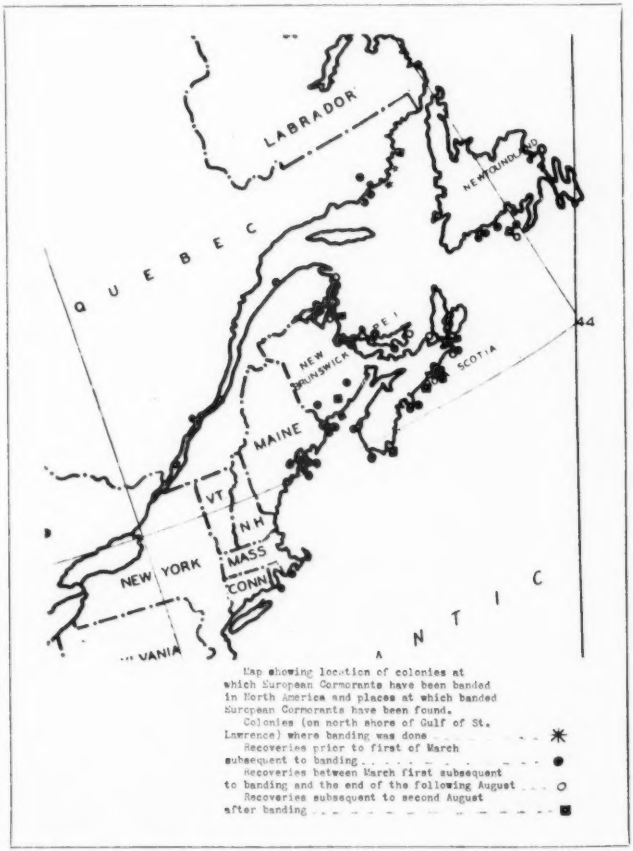
Only four banded European Cormorants have been definitely reported in North America when past their second year. One of these was reported in its third year and the three others were reported in their fifth year, but two of these three had been dead for some time when found.

The months showing the heaviest mortality are October, with 15 deaths, of which 14 were in the first year; November, with 14 deaths, of which 12 were in the first year; and January, with 12 deaths, of which 10 were in the first year. No bands have been recovered from European Cormorants on this continent in the months of May and July.

It therefore appears that young European Cormorants have a high mortality rate during their first year of life, especially in

EUROPEAN CORMORANTS.

Adult and young at nest. Lake Island, Saguenay County, Quebec, July 20, 1933. Photograph courtesy of National Parks Bureau, Canada.


LABRADOR
NEWFOUNDLAND
QUEBEC
44
NEW BRUNSWICK
NOVA SCOTIA
MAINE
VT
NH
MASS
CONN
NEW YORK
... VANIA
ATLANTIC
Map showing location of colonies at which European Cormorants have been banded in North America and places at which banded European Cormorants have been found.
Colonies (on north shore of Gulf of St. Lawrence) where banding was done
Recoveries prior to first of March subsequent to banding
Recoveries between March first subsequent to banding and the end of the following August
Recoveries subsequent to second August after banding

autumn and winter, and a lower, though considerable, mortality rate during their second year of life, but that those individuals that survive their first two years have thereafter a low mortality rate and so may live to be many years old.

Adult birds wearing bands have been seen in the Lake Island colony, where they presumably were breeding, on July 25, 1930; July 20, 1933; and July 4, 1935.[3] That these birds were hatched

[3] See *Bird-Banding*, 2:33, 2:128, and 5:132.

and banded in this colony is practically certain in the case of the banded adults seen in 1930 and 1933, and is highly probable in the case of the one seen in 1935, for none of this species had been banded elsewhere in North America prior to 1933, when banding of European Cormorants at St. Mary Islands first took place. On July 4, 1935, a banded European Cormorant in its second year was also seen at the Lake Island colony.

Of the 65 bands recorded as recovered, 40, or 61.5 per cent, were reported as found on birds that were shot, killed, captured, or injured. In three other instances, forming 4.6 per cent of the total, the birds were caught in fish-nets. One bird, or 1.5 per cent of the total furnishing recovery data, was found in midwinter with much ice frozen to its tail-feathers and died soon afterward, presumably as a result of its exposure to severe weather. Sixteen birds, or 26.2 per cent of the 65 reported, were dead when found and the cause of their death is uncertain. In four cases, or 6.2 per cent of the total number reported, the report merely stated that the bird was "recovered," and it is not known whether it was alive or dead when found.

It is probable that the proportion of European Cormorants killed by man is less than what these figures indicate, for the birds killed by man are, of course, more likely to be reported than are the birds killed by other agencies. It may, nevertheless, be concluded from these data that man is seriously destructive to the unsophisticated young of this large, unprotected non-game bird. The records point to the possibility that a high mortality rate caused by human agency during the migrations of these birds and during their stay on their wintering-grounds may have played a considerable part in the marked decrease in numbers of the North American stock of this species during the latter half of the nineteenth century and the first two decades of the twentieth.

The accompanying map shows the location of the colonies in which the birds were banded and of the places at which they were subsequently reported. The normal winter range of birds from these colonies, at least in the first two years of life, apparently is usually restricted to the central part of the south coast of Newfoundland, the southern and western coasts of Nova Scotia, and the coast of Maine from Penobscot Bay eastward. These are all coasts with relatively mild winter temperatures.

The evidence indicates that the migration of this species is of the diffuse type, without close limitations in either time or space. The general route most commonly followed by young birds in autumn appears to lead more or less closely along the west coast of the Gulf of St. Lawrence, with a marked concentration in Chaleur Bay. Occasionally an individual may stray up the St. Lawrence River. Some young birds evidently go to Newfoundland, but whether this route is taken only by birds that are to winter on the south coast of that island, or whether some migrants proceed to

Nova Scotia by way of Newfoundland is not known. The earliest date on which autumn migration is indicated by the recoveries obtained is August 28th, when a bird of the year was caught in a net at Chatham, on the eastern coast of New Brunswick. There is abundant evidence that the southbound European Cormorants visit New Brunswick and Prince Edward Island in autumn, but the only winter record among the recoveries from these provinces is that of a bird six or seven months old that was found injured at Baltic, Prince Edward Island, on January 1, 1935.

October recoveries are scattered from the north shore of the Gulf of St. Lawrence to Rhode Island. No less than four records for that month are from the State of Maine.

It is perhaps worth noting that none of these banded European Cormorants has yet been reported from the Magdalen Islands, situated in the central region of the Gulf of St. Lawrence, although this species is a regular visitor to those islands and breeds there in small numbers.[4]

The two recoveries from southern New England were both made some time before the beginning of winter and both represent birds of the year. One was "recovered" at Charlestown Beach, on the south coast of Rhode Island, on October 17, 1933, and one was found dead at South Dartmouth, Massachusetts, on the west side of Buzzards Bay, on November 7, 1933.

One winter record is that of a bird a few months old that was shot on January 14, 1924, at Kegashka, Quebec, on the north shore of the Gulf of St. Lawrence, about fifty miles west of its natal colony.

The small number of recoveries in spring that have accumulated up to the present time give very little indication of the migration route followed at that season.

There are only five recoveries from places that are not on or near the coast, namely, one from Magaguadavic Lake, New Brunswick, on November 5th; one from Hatfield Point, New Brunswick, on an inland arm of the Saint John River, on October 1st; one from St. Pierre les Becquets, Quebec, on the St. Lawrence River above Quebec City, on September 26th; one from Wirral, New Brunswick, about thirty miles northwest of Saint John, where it was found dead on September 15th; and one from a point in the Labrador Peninsula, thirty-four miles up stream from the mouth of the Musquarro River, on October 28th. Four of these are records of birds of the year, but the bird found at Wirral, New Brunswick, was in its fifth year.

The resemblances between our North American species of Cormorants are sufficiently close to make positive field identification difficult or impossible when favorable conditions are lacking, and records derived from bird-banding are therefore of special value in building up, in the course of years, a reliable knowledge of the ranges and movements of these birds.

[4] See *The Canadian Field-Naturalist*, 39:113.

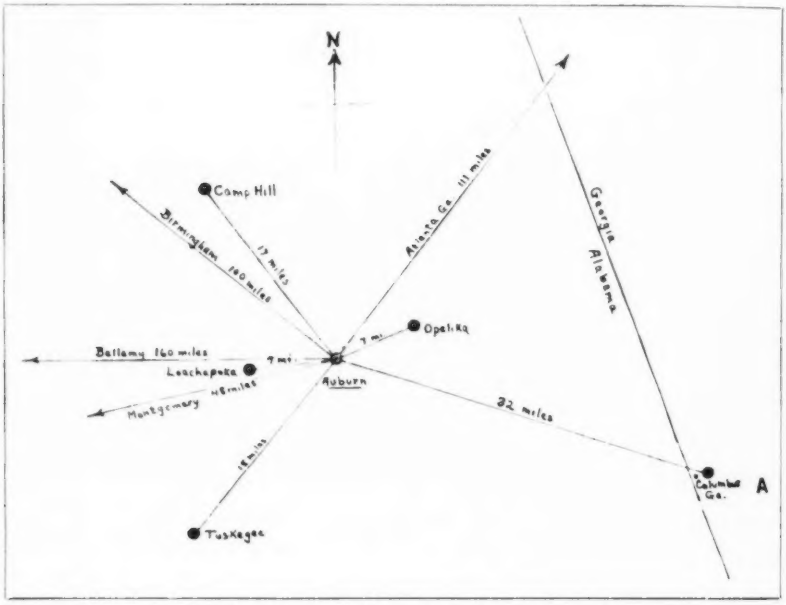


Figure 1. Showing the direction and air-line distance from Auburn, Alabama, to each of the other towns where Chimney Swifts were trapped.

CHIMNEY SWIFT BANDING IN ALABAMA DURING THE FALL OF 1936

By HAROLD S. PETERS

DURING the eight-weeks period from August 16 to October 11, 1936, 21,503 Chimney Swifts (*Chætura pelagica*) were banded in six towns in Alabama and in Atlanta, Georgia.[1] According to the record of the Biological Survey, this is the largest number of birds of any one species ever banded at one station in a single year. The birds were caught in the chimneys of ten buildings in seven towns. The numbers banded in the sixteen attempts varied from 67 (at Bellamy, Alabama) to 6025 (at Atlanta, Georgia). In two instances it was necessary to release, unbanded, 3500 and 3000 birds respectively,

[1] A number of students at the Alabama Polytechnic Institute assisted in this banding work, and their cooperation is gratefully acknowledged. This work was performed during spare time in early mornings and on week-ends. Had more time been available, many more birds could have been banded.

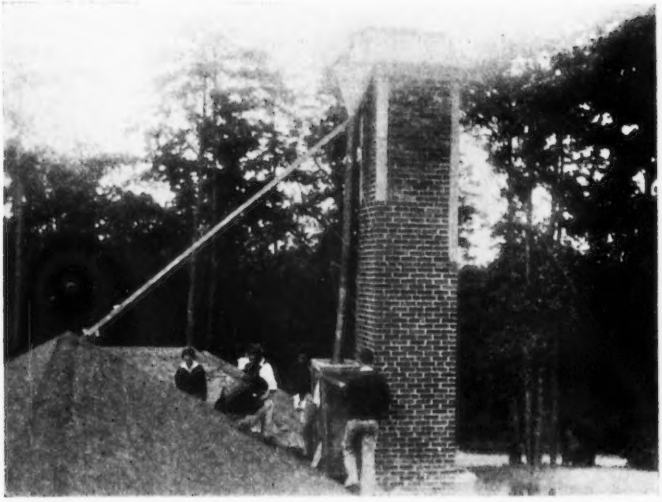


FIGURE 2

A. Showing the trap installed on the chimney of the Northside School, Opelika. The stove pipe connects the trap with the gathering cage, enabling the banding procedure to be continuous.

because of a lack of bands. These 6500 birds were examined, however, to see whether they already wore bands.

Among the approximately 28,000 Swifts examined, we found 24 bearing bands from other stations, and 553 bearing our own bands from previous trappings. Of these 553 local records 248 may be classed as recoveries as the birds were recaptured more than ten miles from the original point of banding. The remaining 305 Swifts are classed as repeats, as they were recaptured at a distance less than ten miles from their original banding point. Twenty-four birds were caught three times, and four birds were taken four times. One of these latter groups was originally banded at Auburn on August 16th, and was recaptured subsequently at Loachapoka on August 30th, at Opelika on September 20th, and at Tuskegee on October 9th. The location of the several towns in which we worked is shown in Fig. 1.

We obtained many interesting records concerning the movements of the birds between the various points of trapping. Table No. 1 shows the numbers of birds caught as local recoveries or repeats in the different attempts, together with the distances traveled from their original point of banding. We were quite interested to find that

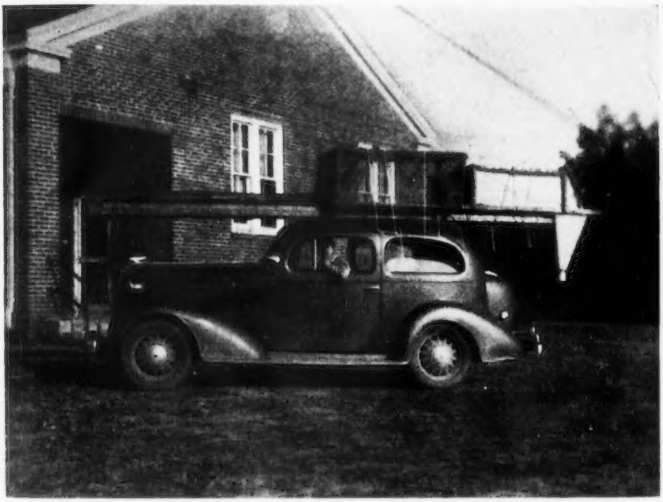
TABLE 1.—LOCAL MOVEMENTS OF CHIMNEY SWIFTS SHOWING NUMBERS AND MILES TRAVELED FROM POINT OF ORIGINAL BANDING TO POINT OF RECAPTURE

Locality Where Birds Were Recaptured	*Date of Recapture*	*Locality and Date of Original Banding With Numbers of New Birds Banded* — *Auburn Aug. 16* 571	*Opelika Aug. 25* 1244	*Opelika Aug. 26* 264	*Loachapoka Aug. 30* 782	*Opelika Sept. 8* 2247	*Loachapoka Sept. 19* 357	*Opelika Sept. 20* 946
Opelika, Ala.	Aug. 25	19 (7 m.)	.....	.....	.....	.....	.....	.....
Opelika, Ala.	Aug. 26	4 (7 m.)	10 (1/10 m.)	.....	.....	.....	.....	.....
Loachapoka, Ala.	Aug. 30	13 (7 m.)	34 (14 m.)	5 (14 m.)	.....	.....	.....	.....
Opelika, Ala.	Sept. 8	5 (7 m.)	16 (¾ m.)	6 (¾ m.)	14 (14 m.)	.....	.....	.....
Loachapoka, Ala.	Sept. 19	1 (7 m.)	.....	.....	1 (0 m.)	14 (14 m.)	.....	.....
Opelika, Ala.	Sept. 20	4 (7 m.)	17 (½ m.)	8 (½ m.)	12 (14 m.)	90 (1¾ m.)	31 (14 m.)	.....
Opelika, Ala.	Sept. 26	2 (7 m.)	5 (¾ m.)	5 (¾ m.)	2 (14 m.)	2 (0 m.)	4 (14 m.)	4 (1¾ m.)
Opelika, Ala.	Sept. 27	2 (7 m.)	2 (½ m.)	2 (½ m.)	1 (14 m.)	5 (1¾ m.)	3 (14 m.)	.....
Camp Hill, Ala.	Oct. 2	1 (17 m.)	3 (20 m.)	.....	5 (15 m.)	2 (20 m.)	2 (15 m.)	.....
Opelika, Ala.	Oct. 3	1 (7 m.)	1 (¾ m.)	.....	1 (14 m.)	.....	.....	.....
Opelika, Ala.	Oct. 4	.....	1 (½ m.)	1 (½ m.)	.....	1 (1¾ m.)	.....	.....
Opelika, Ala.	Oct. 6	1 (7 m.)	1 (½ m.)	2 (½ m.)	2 (14 m.)	1 (1¾ m.)	1 (14 m.)	.....
Tuskegee, Ala.	Oct. 9	6 (18 m.)	12 (24 m.)	1 (24 m.)	11 (14 m.)	15 (24 m.)	7 (14 m.)	5 (24 m.)
Atlanta, Ga.	Oct. 11	.....	.....	.....	.....	1 (105 m.)	.....	3 (105 m.)
Total Recaptured—Recoveries		7	49	6	48	32	48	8
Total Recaptured—Repeats		52	53	24	1	99	0	4
Total Number Recaptured		59	102	30	49	131	48	12

TABLE 1.—LOCAL MOVEMENTS OF CHIMNEY SWIFTS SHOWING NUMBERS AND MILES TRAVELED FROM POINT OF ORIGINAL BANDING TO POINT OF RECAPTURE—Continued

Locality Where Birds Were Recaptured	*Date of Recapture*	*Locality and Date of Original Banding With Numbers of New Birds Banded* — *Opelika Sept. 26* 1230	*Opelika Sept. 27* 1204	*Camp Hill Oct. 2* 659	*Opelika Oct. 3* 791	*Opelika Oct. 4* 525	*Opelika Oct. 6* 863	*Total Recoveries*	*Total Repeats*	*Total Banded Birds Taken*
Opelika, Ala.	Aug. 25	.....	.....	.....	.....	.....	.....	...	19	19
Opelika, Ala.	Aug. 26	.....	.....	.....	.....	.....	.....	...	14	14
Loachapoka, Ala.	Aug. 30	.....	.....	.....	.....	.....	.....	39	13	52
Opelika, Ala.	Sept. 8	.....	.....	.....	.....	.....	.....	14	27	41
Loachapoka, Ala.	Sept. 19	.....	.....	.....	.....	.....	.....	14	2	16
Opelika, Ala.	Sept. 20	.....	.....	.....	.....	.....	.....	43	119	162
Opelika, Ala.	Sept. 26	.....	.....	.....	.....	.....	.....	6	18	24
Opelika, Ala.	Sept. 27	42 (1¾ m.)	.....	.....	.....	.....	.....	4	53	57
Camp Hill, Ala.	Oct. 2	2 (20 m.)	2 (20 m.)	.....	.....	.....	.....	17	0	17
Opelika, Ala.	Oct. 3	4 (0 m.)	7 (1¾ m.)	8 (20 m.)	.....	.....	.....	9	13	22
Opelika, Ala.	Oct. 4	4 (1¾ m.)	.....	.....	7 (1¾ m.)	.....	.....	...	14	14
Opelika, Ala.	Oct. 6	2 (1¾ m.)	.....	1 (20 m.)	3 (1¾ m.)	3 (0 m.)	.....	4	13	17
Tuskegee, Ala.	Oct. 9	4 (24 m.)	5 (24 m.)	4 (28 m.)	6 (24 m.)	2 (24 m.)	4 (24 m.)	82	0	82
Atlanta, Ga.	Oct. 11	.....	3 (105 m.)	2 (110 m.)	1 (105 m.)	2 (105 m.)	4 (105 m.)	16	0	16
Total Recaptured—Recoveries		6	10	15	7	4	8	248	...	...
Total Recaptured—Repeats		52	7	0	10	3	0	...	305	...
Total Number Recaptured		58	17	15	17	7	8	...	...	553

B. Showing the trap installed on the chimney of the Southside School, Opelika.



C. Showing the extension ladder, stove pipe, gathering cage, and trap tied on the top of a car for transporting to and from the banding location. Distances up to twenty miles were easily covered quickly with no damage to the equipment or car.

birds banded in Auburn on August 16th were recaptured in nearly every subsequent banding in the near-by area, and as late as October 9th at Tuskegee. There seemed to be a considerable hang-over of the birds during this eight-weeks period, and the birds from the early bandings did not all depart on their southward migration in a body as we might expect them to do.

On October 11th, at Atlanta, Georgia, 6025 Swifts were banded with the coöperation of several members of the Atlanta Bird Club. We were greatly surprised to catch sixteen birds that had previously been banded at Opelika and Camp Hill, Alabama, 105 and 110 miles southwest of Atlanta. Four of these birds had been banded at Opelika on October 6th which showed a northeastward movement of 105 miles in five days. This illustrates that considerable random flying is done by these birds in connection with their daily feeding while making their leisurely southward migration. Banding the 6025 birds at Atlanta required seven hours of continuous banding by eight persons.

We have used about 14,000 bands of size 1-A and about 7,000 of size 1. Size 1-A bands seem preferable for use on Chimney Swifts, as quite often size 1 proved too small to fit correctly on birds with large tarsi. The numbers of the bands used by us were as follows:

F-100034	to F-100050 =	17
36-85001	to 36-86000 =	1,000
36-72301	to 36-72500 =	200
36-146201	to 36-146300 =	100
36-146305	to 36-146347 =	43
36-146350	to 36-146400 =	51
36-157001	to 36-162000 =	5,000
37-27001	to 37-33025 =	6,025
37-105001	to 37-114067 =	9,067
	Total	=21,503

These numbers are listed to assist other banders in quickly identifying our birds. I believe it would be helpful for those persons banding this species in large numbers to exchange data in order to enable them to identify one another's birds quickly.

The trap we used was somewhat modified from that described in the "Manual for Bird Banders" and in the article by Professor Green in *Bird-Banding*, 1930, vol. I, p. 107–111. Our trap was 42 inches long, 27 inches wide, and 18 inches high. The inside was lined with black oilcloth, and ordinary window-screen was used to cover the top. This trap was placed on the chimney after dark or after the birds went in to roost. Just after daylight, when the birds tried to leave the chimney, they flew up and hit the wire screen on top of the trap, and then in an effort to escape, they moved toward the slanting celluloid window at one end. As they could not cling to this sloping smooth surface, they fluttered down into the galvanized funnel, which allowed them to slide down through the six-inch

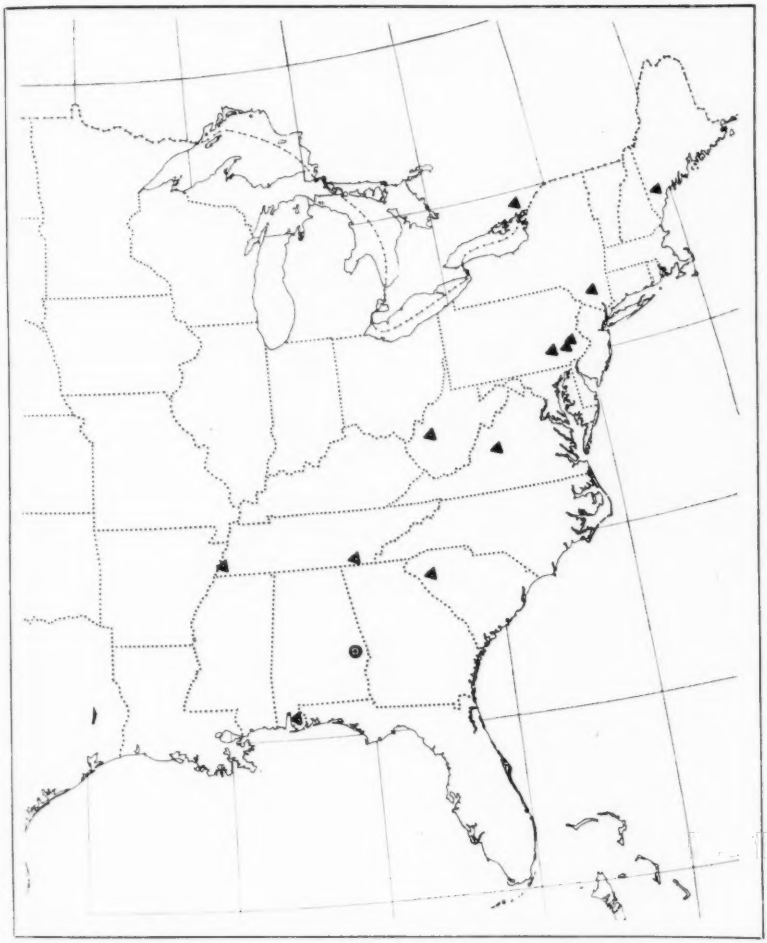


Figure 3. Showing position of Auburn in relation to original banding points of Swifts caught during this study. Points shown are as follows: Kingston, Ontario; Brunswick, Maine;[2] New Paltz, New York; George School, Pennsylvania; Mont Clare, Pennsylvania; Pheonixville, Pennsylvania; University, Virginia; Charleston, West Virginia; Memphis, Tennessee; Chattanooga, Tennessee; Clemson, South Carolina and Fairhope, Alabama. Auburn is indicated by a black dot on white, bordered by a heavy black circle.

[2] Brunswick, Maine, should read Kent's Island, New Brunswick. See footnote, page 23.

TABLE 2.—SUMMARY OF CHIMNEY SWIFT BANDING IN ALABAMA, 1936, SHOWING RECOVERIES FROM OTHER STATIONS

Date and Place of Banding		Number Birds Banded	Released Not Banded	Local Birds		Other Station Recoveries			
				Repeats	Recoveries	No.	Date	Locality	Bander
Aug. 16	Auburn	571	....	...	...	0	.....	.....	.....
Aug. 25	Opelika	1,244	....	19	...	1	May 30, 1936	Kingston, Ont.	Miss Ida Merriman
Aug. 26	Opelika	264	....	14	...	0	.....	.....	.....
Aug. 30	Loachapoka	782	....	13	39	1	May 10, 1936	Kingston, Ont.	Miss Ida Merriman
Sept. 8	Opelika	2,247	....	27	14	5	Sept. 20, 1935	Mont Clare, Pa.	Charles G. Krieble
							.....	Kingston, Ont.	Miss Mary C. Baker
							May 16, 1935	Kingston, Ont.	Miss Ida Merriman
							May 30, 1936	Kingston, Ont.	Miss Ida Merriman
							Sept. 2, 1932	New Paltz, N. Y.	A. K. Smiley, Jr.
Sept. 19	Loachapoka	357	....	2	14	0	.....	.....	.....
Sept. 20	Opelika	946	3,500	119	43	7	Sept. 6, 1931	New Paltz, N. Y.	A. K. Smiley, Jr.
							May 12, 1934	Kingston, Ont.	Miss Ida Merriman
							May 24, 1935	Kingston, Ont.	Miss Ida Merriman
							May 16, 1936	Kingston, Ont.	Miss Ida Merriman
							.....	Brunswick, Me.	A. O. Gross
							Apr. 5, 1934	Clemson, S. C.	R. E. Ware
							Apr. 19, 1936	University, Va.	John B. Calhoun
Sept. 26	Opelika	1,230	....	18	6	0	.....	.....	.....
Sept. 27	Opelika	1,204	....	53	4	0	.....	.....	.....
Oct. 2	Camp Hill	659	....	...	17	1	May 10, 1936	Kingston, Ont.	Miss Ida Merriman
Oct. 2	Bellamy	67	....	...	...	0	.....	.....	.....
Oct. 3	Opelika	791	....	13	9	0	.....	.....	.....
Oct. 4	Opelika	525	....	14	...	0	.....	.....	.....
Oct. 6	Opelika	863	....	13	4	1	Oct. 10, 1933	Memphis, Tenn.	B. B. Coffey, Jr.
Oct. 9	Tuskegee	3,728	3,000	...	82	5	May 12, 1935	Kingston, Ont.	Miss Ida Merriman
							May 1, 1934	Fairhope, Ala.	Duncan McIntosh
							Sept. 29, 1934	Mont Clare, Pa.	Charles G. Krieble
							May 20, 1930	George School, Pa.	John Bartram
							Sept. 15, 1927	Charleston, W. Va.	I. H. Johnston
Oct. 11	Atlanta, Ga.	6,025	....	...	16	3	Oct. 5, 1930	Chattanooga, Tenn.	Wyman R. Green
							Sept. 26, 1934	Phoenixville, Pa.	Charles G. Krieble
							May 24, 1936	Kingston, Ont.	Miss Ida Merriman
	Totals	21,503	6,500	305	248	24	.....	.....	.....

stove-pipe into the large gathering-cage. Our gathering-cage was four and a half feet high, three feet wide, and two feet deep. It consisted of a wooden framework covered with screen wire, and had two small doors on one side which were useful in removing the birds. The entire set-up is shown in the photographs in Fig. 2, as well as our method of transporting the equipment on top of a car. Sufficient stove-pipe was used to connect the trap and the gathering-cage standing on the roof at the base of the chimney, so the birds could be removed from the cage as soon as any came out of the chimney, thus speeding up the banding procedure. We generally had no difficulty in starting the birds just after daylight. If necessary, we pounded on the outside of the chimney with sticks and allowed from one to two thousand to come out into the large gathering-cage. The flow of birds was shut off by the simple process of throwing a blanket over the screen on the top of the trap, thereby darkening the chimney and keeping the other birds quiet until the blanket was removed and the birds were again started by pounding on the chimney. During the handling of the 6025 birds at Atlanta we filled our large gathering-cage four times by this method and experienced no difficulty with birds smothering in the cage. In earlier bandings, before this technique was developed, we had some difficulty with the birds coming out in too large numbers.

The chimneys we worked were mostly those at school buildings, and they varied greatly in height and in the size of the flue opening. Their heights ranged from ten to twenty-eight feet from the roof, making it necessary to use an extension ladder to attach the trap to the chimney. The trap was fitted to flues of various sizes by placing boards over that part of the flue not covered by the trap.

Table No. 2 shows the recoveries from other stations caught during our various banding attempts. It is quite interesting to note that eleven of these twenty-four recoveries were from Kingston, Ontario, Canada, while the others were banded in Maine,[3] New York, Pennsylvania, Virginia, West Virginia, South Carolina, Tennessee, and Alabama. The original localities of all these recoveries, except that from Memphis, Tennessee, make an almost direct northeast-southwest line with our banding points, as shown on the map in Fig. 3. This may indicate that most of the birds passing through east-central Alabama on their southward migration come down along the eastern slope of the Appalachian Mountains. The direction they take after leaving our locality and continuing their southward migration remains to be determined. We are hoping that other banders

[3]Since this manuscript was sent to the printer, the following has been received from Dr. A. O. Gross: "I am glad to report that band 36-26804 was placed on a Chimney Swift at our Bowdoin Scientific Station, located on Kent's Island, in the Bay of Fundy, New Brunswick, Canada, on August 23, 1936. It flew into one of the buildings during a rain storm and is the only Swift that we banded." Hence the record as given in Table 2 and Figure 3 as Brunswick, Maine, should be changed to Bay of Fundy, New Brunswick. This bird flew about 1,500 miles before being captured by us at Opelika, Alabama, on September 20th, in just 28 days.

will capture some of our birds during the next few years and thus assist in determining more accurately the migration route or routes of this bird. A determination of the migration routes is especially desirable for the light it may throw on the still unknown wintering-range of the species.

We found that considerable interest was aroused in the Chimney Swift banding work among students interested in biology, and little difficulty was experienced in obtaining sufficient assistance to carry on our trapping work. We are hoping that enough enthusiasm has been aroused in this area to conduct Chimney Swift banding on an intensive scale in future years. We are especially anxious that bird-banders in other sections of North America should make an effort to trap Swifts as they can be so easily trapped and banded in large numbers. The author will be glad to furnish any further details concerning our equipment and methods to banders who may be interested in obtaining such information.

Biological Survey, Auburn, Alabama.

SOME BLUEBIRD OBSERVATIONS

By WENDELL P. SMITH

AT my banding station at Wells River, Vermont, two pairs of the Eastern Bluebird (*Sialia s. sialis*) nested in boxes close to my home each year during the five year period 1930–1934. The birds were intermittently observed in the nesting season. While the record is incomplete, some interesting observations were made, and these are offered in the hope that they may lead to further intensive observation of this and other species.

The spring arrival dates of Bluebirds at Wells River for the period of 1930–1934 were as follows: 1930, March 16; 1931, March 28; 1932, March 26; 1933, March 26; 1934, March 29.

These first migrants are apparently birds of passage, for there is an interval of several days following the arrival of the species when Bluebirds are not present continuously. Then comes a period when singing is more often heard and the individuals show a sustained interest in a definite locality and inspect frequently possible nesting-sites. The dates when this form of activity was first noticed follow: 1930, April 1; 1931, April 7; 1932, April 5; and 1934, April 7. On March 31, 1933, three males were contending for the possession of a nest-box. The average date of arrival of breeding Bluebirds determined by this method is ten and one-half days later than the first appearance of the species at this place. For the five-year period the first-appearance date varies by fourteen days, while during the same length of time the first evidence of sustained interest in breeding territory varies by only eight days.

In only one instance can the length of time elapsing between the selection of a breeding territory by the male and the acquisition of a mate be given. On April 2, 1934, a male Bluebird was seen several times in the vicinity of a nesting-box. On the following day he was observed clinging to the entrance at intervals and he entered once, at least. On April 9th, he was joined by a female, who began a more thorough inspection of the box.

The date of the beginning of nest-building varies considerably for the period. While the data are not complete for either of the two pairs, the partial records indicate an average date for the inception of nest-construction thirteen days later in the case of the occupants of No. 2 box than for those using box No. 1. The earliest date on record is April 11, 1930, and the latest, May 7, 1931. The average date when nest-building activity was first observed for the two pairs was April 22d.

Nest-building did not proceed with uniform speed, especially in the case of an early beginning. There seemed to be some correlation with temperature, as cessation of activity coincided with lower temperature and resumption of construction began with the coming

of warmer weather. The time required for a nest's completion differed in consequence. The shortest period recorded was four days, and the longest twelve days.

Material was secured within a radius of seventy-five feet of the nest, and much of it within less than half that distance. In one case dried grass was used, while in the other, dead pine needles were obtained from the ground near by. Observations showed that the female performed nearly all the work of collecting.

Between the completion of the nest and the laying of the first egg some time intervened, usually two or three days. The earliest date of nest-completion was April 17th, and the latest May 11th, while the records of first egg were April 20th and May 13th respectively.

Usually egg-laying proceeded regularly with one egg each day until the completion of the clutch, but one exception was noted in the case of No. 2 pair. The female of this pair began laying on May 13, 1931, and continued laying one each day until the 15th, but on the 16th no egg was laid. Laying was resumed again on the 17th, and continued in consecutive order until the 18th, when the clutch was completed with the fifth egg. Clutches varied in number from four to six eggs. The same individual female differed in the number laid in the first nesting from year to year. No. A223086, banded as the occupant of No. 2 nest on May 10, 1932, and retaken in the same box on May 7, 1933, incubated a clutch of six eggs in 1932 and five in 1933. Incubation also varied somewhat. It usually began with the completion of the clutch, but one instance was recorded where it began with the laying of the fourth egg in a complement of six.

Of nine successful incubations of the two broods, the period consumed 14 days in four instances, 15 days in three, and 13 and 16 days respectively, in two instances. There could not be detected any cause for the difference, no seasonal variation being evident, nor individual so far as the limited observations went. No. A223086 required 14 days for the incubation of the five eggs of the first brood, while 15 days were occupied in that activity for the second brood of the same number.

The time of egg-laying varied somewhat with the individual, and considerable difference existed between the females of the two pairs. The female of No. 1 pair laid before six o'clock in the morning, while the female of No. 2 pair usually laid between 6.30 and 8.00 A.M., although entering and leaving the nest in connection with this activity were delayed half an hour in a number of cases, and on one occasion the bird did not enter for laying until nine o'clock.

The duties of incubation were performed largely by the female, but in one instance the male was seen to take his mate's place upon the eggs three times in the course of three hours. The male

of No. 2 pair fed his mate at intervals and maintained the semblance of a watch during her absences for food. Often the male would fly to the box, or a near-by limb, uttering rapid call-notes, whereupon the female would fly out and away for feeding. The male did not always remain near until his mate's return, but not infrequently he left shortly after the departure of the female. Absences, from meager observation, varied both in frequency and in regard to length of time. One nest was under observation from 3.15 to 5.30 P.M., and schedule is as follows: Female left at 3.27, returned at 3.35; remaining on the nest until 3.52. At 3.57 the male entered the nest and incubated until 4.17, when he left. At 4.18 the female returned to stay until 4.25. The male returned to the nest at 4.26, staying until 4.33 and returning again three minutes later for another period on the nest, which lasted until 4.48. The female entered the box at 4.59, and remained until 5.16. After four minutes' absence, she came back and was still on the nest at the close of the observation period, ten minutes later. The male of No. 1 pair was not seen to take any part in the duties of incubation, although considerable time was spent in observation, three and a half hours being spent at one sitting.

Observation of the care of the young consumed some time and in this it was noted that a marked difference in individual behavior occurred in the parents and some variation in the same individual. The male of No. 1 pair was not seen to feed the young. He was in the vicinity of the nest often and sang a phrase or two at intervals, but did not approach the nest while we were watching. The male of No. 2 pair, on the other hand, was particularly active and during some of the observation periods fed the young more often than the female did. The brooding of this pair was carried on exclusively by the female so far as we could learn. Typical feeding schedules follow. Brood of No. 2 pair under observation for one hour on second day, period extending from 2.09 to 3.09 P.M. Female entered box at 2.14:30, brooded until 2.22, left and returned with food at 2.24, brooding until 2.28:30, when she left to return at 2.29:30 to brood until 2.43. She returned with food at 2.43 and brooded until 2.52, when she left to return to feed at 3.00 and brood until 3.08. At 3.09 she came back to feed. Meanwhile the male brought food at 2.34:30, 2.37, 2.45, and 2.58:30. Total feedings for the interval were nine, five by female and four by male, and brooding lasted twenty-seven and a half minutes divided into five separate periods. This may be compared with an hour's observation five days later, the period extending from 2.54 to 3.54 P.M. Nine feedings occurred within this interval also, but six were by male and three by female and the brooding occupied twenty-nine and a half minutes divided into two separate intervals. Two of the male's visits with food occurred when the female was inside the box, and the former thrust his head into the entrance hole and presumably delivered the food

to his mate. Observation of No. 1 pair revealed some differences in behavior, due in part perhaps to the inactivity of the male. One hour's schedule when the young were four days old totaled three feedings and one period of seventeen minutes' brooding. At five days old, forty minutes' observation yielded seven feedings and two intervals of brooding, amounting to thirteen minutes. Three hours and forty-five minutes of watching, when the brood had reached the age of ten days, showed twenty feedings and no brooding periods.

In general the period passed by the young in the nest was eighteen days. One exception occurred in the case of No. 2 pair in 1933, when the first brood of four left the nest after seventeen days.

The growth of the young was observed and daily measurements taken. Nestlings on the first day varying from 31 to 41 millimeters in length had at time of leaving (17th or 18th day) increased to a minimum of 125 mm. or a maximum of 130 mm. Culmen on the first day varied from 5 to 5.5 mm. and completed its growth on the fifteenth or sixteenth day. Wing varied from 12 to 14 mm. on first day but at nest-leaving time had increased to from 90 to 95 mm. The tarsus, varying in length from 4 to 5 mm., attained complete growth on the 15th day. The most rapid gain in length, 12 to 14 millimeters, occurred between the 4th and 5th days, while that of the wing, an increase of 5 to 6 mm., came between the 7th and 8th days; that of the bill, 1 to 2 mm. between the first and second days, and that of the tarsus, a gain of 2 to 3 mm., between the 6th and 7th days, in the case of No. 2 pair in 1931. For two years the brood raised in this nesting-box showed the most rapid gain in length between the 16th and 17th days, a growth of 9 to 10 millimeters. No twenty-four hour period produced a disproportionately longer growth of the culmen. The most rapid growth of wing in the 1933 brood came between the 7th and 8th days, coinciding with that of the 1931 brood. The eyes usually began to open on the 4th day, but in one instance this was delayed until the seventh day. Completion of the process required from three to five days. Tail-feathers appeared on the 8th day. Primaries became noticeable on the 4th day.

The colors of the developing plumage and the soft parts were in part observed during the period passed within the nest. The natal down was dark mouse gray.[1] The bill was antimony yellow except the edges of the mandibles, which were mustard yellow and the feet cinnamon buff. By the second day the bill had changed to chamois, while the edges had become Marguerite yellow. The upper mandible became noticeably darker on the third day, and on the fourth day both mandibles were much darker with the edges white. Darkening continued with the edges remaining light longer than other parts, and it was not until the 14th day that darkening of this area was observed. By the 17th day the bill had become like that of the adult

[1] Colors according to Ridgway's "Color Standards and Color Nomenclature."

in color. Tarsi and toes changed more rapidly, becoming the color of an adult's on the 9th day. The first blue tinge appeared in the wings on the 9th day, and the spots on breast appeared on the 14th day.

As far as possible the family fortunes were followed after nest-leaving. The initial flight carried the young only a short distance from the nest, and the succeeding four or five days were passed within a radius of three hundred feet. The first brood of No. 2 pair left the nest on June 18, 1931. Until June 22d, they remained in the vicinity, varying in distance from one hundred to three hundred feet. Then followed a break in observation due to our absence. On June 30th, they were still in the same locality and also on July 1st. The latter date marks the beginning of a second nest by the parents, but, notwithstanding, some time was spent by both parents with the young. On July 6th the same conditions obtained. On July 7th, the four young were seen without their parents some six hundred feet from the nest. On this date the first egg in the second clutch of their parents was laid in the old nest-box. Four young Bluebirds were seen together on three subsequent occasions, the last being on July 21st, but they could not be approached near enough to determine presence or absence of bands. During the period of August 2d–7th, a flock of Bluebirds containing both adults and young were seen about eight hundred feet from the nesting-site. Among them were both adults and young wearing bands, but they could not be trapped to determine their identity. On August 18th, and again on August 24th, a mixed flock of eight or nine individuals of this species was seen a third of a mile away. One immature bird was wearing a band. A brood of No. 2 pair left the nest on June 8, 1933, and their subsequent history is similar, the male being seen with them until the second brood hatched on July 2d. On July 11th one individual of the first brood was seen on the nest-box cover. A parent bird nearby viewed the intrusion with indifference. On July 13th the female of No. 2 pair disappeared, and on the following day the young of the second brood were found dead in the nest. The male spent this day (July 14th) in calling from a near-by building and then rejoined the first brood, as he was seen with them on July 15th. They were last seen on July 28th some twelve hundred feet away from the nesting site.

As far as possible the degree of success attending breeding activities was noted during three seasons. One or two nestings probably occurred in a different locality and in a location where observations could not be made. It seemed certain that this was the case for the second brood of No. 1 pair in 1932. During the season of 1931, the two pairs laid 19 eggs, hatching 17 young, and 8 of these left the nest. The season of 1932 for the three nestings of the two pairs yielded 15 eggs, from which 11 nestlings hatched and 9 young birds

left the nest. In 1933, 20 eggs were laid, with 13 hatching and 8 young leaving the nest. During the three-year period, destruction of eggs was occasioned by a high wind in one instance, causing the fall of the nest-box and breaking five eggs; by a boy in two instances with a loss of five eggs; and by the removal of one egg from the nest, possibly by a squirrel, and the failure of two eggs to hatch. Mortality in the young was caused by illness in one case, a diarrhoea attacking one of a brood of five and making rapid progress, causing the death of all within forty-eight hours; in another instance an unknown disease caused the loss of five; four young died from starvation, probably due to the death of a parent; and one young bird removed from the nest by an unknown agent. This gives a reproductive efficiency rate of 46.29 per cent.

An attempt at a third nesting occurred in 1934. The occupants of No. 1 box became mated about April 17th. We did not keep detailed records of the activities of this pair that year, except to record the raising of two broods. On August 22d we found 5 eggs in the box, and incubation was carried on until September 4th, when the eggs were abandoned and the pair disappeared from the area. This coincided with the passing through the area of a large flock of migrant Bluebirds. We did not see the behavior of the nesting pair and cannot say that they joined the birds of passage, but the facts suggest possibilities that would make further observation interesting. Unfortunately such late nesting is rare at the author's station.

The male of No. 2 pair showed considerable pugnacity whenever his right to the territory seemed challenged. Two small trees overshadowing the box and a fence close by seemed to be deemed inviolable, and any intruder was instantly menaced. An amusing instance of this occurred when a young rooster flew to the top rail of the fence and began to crow. The male Bluebird darted at him so swiftly and with such a show of spirit that the cock abandoned his activity with undignified haste after the third or fourth sally. A more serious clash followed an attempt on the part of a male Tree Swallow to take possession of the box. The two birds closed with each other and descended to earth, even rolling on the ground during one contest, but after efforts lasting a day the Swallow gave up the attempt.

The above observations have been interesting not only for the facts noted but even more for the problems suggested, which are many, requiring both intensive and extensive study.

Wells River, Vermont

THE GROWTH OF YOUNG BARN SWALLOWS

By HAROLD B. WOOD

Two Barn Swallows (*Hirundo erythrogaster*), were hatched in a nest above my window and in ten days were transferred to an artificial nest on my window-sill at a mountain cabin on the top of the Allegheny Mountains at Cherry Springs, Potter County, Pennsylvania. I had an exceptional opportunity to observe at a distance of only a few inches through a hole in the paper window covering, their being reared, and to handle them.

Two eggs were laid on successive days, and each was hatched exactly seventeen days after being laid. Coming from an egg which measured approximately two centimeters long, the young Barn Swallow had the following measurements from his crown to the end of the body: 3.0 cm. when one day old, 4.5 cm. when 3 days old, 5.8 cm. when 6 days old, 8.8 cm. when 9 days of age. The eyes of the nestling began to open on the sixth day and were completely open by the eleventh day.

When hatched the young were adorned with dark-gray downy tufts, 5 mm. long, located as frontal, occipital, scapular, and mid-dorsal. The down persisted, and one bird had a few wisps on the head when it flew from the nest. The downy tufts had no relation to the location or development of the early pin-feathers, which appeared first along the ulmer side of the wing on the 4th day, followed soon by pin-feathers over the back. These showed a bluish sheen on the 16th day. On the 8th day pectoral pin-feathers began to show, four rows on the outside of dark feathers, next one row with white tips, next six rows of white breast pin-feathers. The brown forehead feathers began to show on the 14th day. The tail was 1.1 cm. long on the 12th day, 3.0 cm. on the 17th, and 4.0 cm. on the 18th day. The wing on the 19th day, the day of flight, as 8.1 centimeters long. The measurements of the adults were: male, length 17.6 cm.; tail 9.0 cm.; wing 12.0 cm.; female, length 15.7 cm.; tail 7.5 cm.; wing 12.0 cm.

The young birds began to preen when fifteen days old, first by drawing the open bill along the shafts of the wing, then along the tail-feathers, to remove the white scales. Later the feathers were drawn through the bill by wing motion. The birds did not preen or pick at each other. They did not purposely pull out the tufts of down. Preening was done only to free the feathers from the scales, which soon formed a considerable deposit in the bottom of the nest. Neither nestlings nor adults had ectoparasites.

Feeding was done by both parents. Many observations showed that the young were given about the same number of feedings. There was no selection by the parents as to which nestling was to receive the next morsel. It was given to the young bird that was

ready first to receive it, that had its mouth open first, that was leaning farthest forward, or that called for it. When very young the nestlings would not open their mouths until the parent forced its bill inside. Later the adult would thrust its bill full length down the young bird's throat, even when the young was two weeks old, apparently to prevent a live fly from crawling out, as I saw happen. Often the adult called *asch* while holding a fly, to get the young bill opened. The usual system of feeding was for one or both adults to give all feedings to only one bird until it was satisfied, after getting from five to fifteen insects; then the young bird would turn around in the nest and sleep while the other took a turn. Sometimes both would be fed together for a while, as when the older was fifteen days old, both birds were given 12 feedings in a quarter of an hour, they rested the nest half-hour, received twenty feedings the next fifteen minutes and none the next thirty.

The feeding of the nestlings was not observed the first week, but after that I distinctly saw whole flies and small moths given them. I do not believe they were given any bolus or predigested food. When the older was only two days old, the parents changed places at the nest at intervals from a half-minute to six minutes, averaging one and a third minutes, for thirty observations. This precluded any opportunity for the adult to digest and disgorge any food. Later, the intervals for bringing up a newly caught fly were as short as ten seconds. Practically all food for the young was caught over a half-acre of ploughed ground. The young birds would swallow the recently killed flies I placed in their mouths. I was afraid to test them with old dead, possibly moldy, flies. They made no attempt to pick up flies or caterpillars placed before them, except one fly the day before the young bird left the nest. They were seen being fed a few times by their parents after leaving the nest. An extra male Barn Swallow frequently flew past the nest and looked at the young birds but never made any attempt to feed them.

Vocal development began with a little noise when three days old, a very faint squeak. When twenty days old they began to utter *schup*, later *swee* and *yee*, and were soon imitating the adult note of *asch*, using that to call for food when an adult flew past. The meaning of the various calls was not determined.

Muscular development was noted by the fact that when nine days old the birds could crawl by pushing the head along the board. They could not raise the head until sixteen days old, when they began to sit upright on the rim of the nest. When ten days old a bird was placed on the shelf facing away from the nest. It at once turned around and began crawling toward the nest. Bank Swallows will do the same.

Emotionally, the young birds responded to only one noise, the call of the parents. My imitation could not get their mouths open. A thunderstorm had no effect upon them, not even changing their

normal respiratory rate of 120 per minute. The nestlings were awake early. On the 5th and 6th days they awoke at 4.45 A.M. and 4.40 A.M. respectively. When two weeks old their first morning call was at 4.25 A.M., but on the 12th and from the 15th to the 18th day it was timed exactly at 4.35 A.M. The adults reported soon afterward for the day's activities.

Their method of defecation preserved the sanitation of the nest, all evacuation being done over the rim of the nest. The adults carried most of the sacs away in their bills, the mother getting hold before the sac was completely discharged, the father always waiting until it had fallen.

The parents were distinguishable by variations in the color of the breast-feathers, by a short outer tail-feather in the male, and by their being banded on different legs. The older nestling was given a right-leg band C46502, the younger a left band numbered C46503.

Bird behavior was closely watched. About six hundred feet from the shack where my Barn Swallows nested was a pavilion of a tourist park in which another pair of Barn Swallows built a nest on the side of a rafter. They raised four young. During the course of the raising of my Barn Swallow family a lone male Barn Swallow would fly round with the parents of my set. He flew sometimes alone in our vicinity. His mate never appeared until their young were out of the nest. When my set was in the window-sill nest, the strange male would fly past but a few feet away, and undoubtedly saw and heard the young birds, but he never made any attempt to feed them. He simply flew past, but usually when the parents were circling by. A three-foot stake had been driven into the ground twenty feet from the nest, and upon it one of the parents frequently rested, but mostly the male. Once, when the male was on the stake, the strange bird tried to alight on it also, but there was room for only one bird. Then he flew to the ground, and the father flew down and drove him away. That was the only antagonistic action shown this stranger.

After the young had begun to fly, the two families were often intermingled in flight, but I frequently saw one set of six flying Barn Swallows and another of four, flying apart. They would mix on the telephone-wires, but I often saw my two banded parents together on the wire, and their two banded young sitting separated or else very close together like doves. The bands could be seen with glasses.

The parents were attentive to the needs of their young. After the young had been removed to the nest on the window-sill the parents spent their resting time on the telephone wire about thirty feet away. They would then sally forth frequently to view their offspring, swooping past the nest. I did not see them turn the head to look at the nest while flying, but they would fly towards it and make a sudden swerve, allowing an opportunity to see the nestlings. When

hungry, the young rarely called for food except when they could see their parents flying past, or when they came to the nest.

When seventeen days old the nestlings began to try flapping their wings, while standing on the rim of the nest. They did not leave the nest until they flew away and never returned. My handling them did not induce their flight. When nineteen days old the older bird suddenly flew from my hand out the window and made its first flight 548 feet to an apple tree, to which it was followed by its mother. That evening the other bird left the nest. The family was seen to keep together until it left presumably on its southern migration, August 13th.

GENERAL NOTES

Alligators Interfere with Duck-Banding.—During the early days of September, 1936, an unusual number of migratory wild fowl were using my ponds at Avery Island, Louisiana, coming early in the fall migration, so I decided to begin banding more than a month earlier than usual.

Having baited trap No. 1 in my rest pond, using broken rice for this purpose, I set the trap on the afternoon of September 9th at four o'clock, and the ducks were taken out of it at seven o'clock on the morning of September 10th.

I expected a catch of at least one hundred and fifty ducks, as there was a large number of ducks of various species in the pond. On nearing the traps that morning, I was disappointed to see comparatively few ducks in it. The reason was soon apparent. The trap contained two alligators. One of them—a male eight feet three inches in length—had gone into the receiving pen and filled himself up on the ducks he found there. The other, a four-feet-two-inches alligator, was still in the main trap, and the ducks did not seem to pay much attention to it.

After getting the ducks out of the traps and banding them, I found there were 37 Blue-winged Teals (*Querquedula discors*)
37 Wood Ducks (*Aix sponsa*)
7 Fulvous Tree-ducks (*Dendrocygna bicolor helva*)
11 Mottled Ducks (*Anas fulvigula maculosa*)
8 Pintails (*Dafila acuta tzitzihoa*)

There were four dead ducks in the trap, killed by the alligators, and on skinning the alligators, we found the stomach of the large one to contain four Wood Ducks and three Blue-winged Teals. The small alligator had swallowed two Blue-winged Teals, and had killed two Wood Ducks, but they were too large to swallow. One of the Wood Ducks taken from the large alligator wore band number 35-514126. One of the Blue-winged Teals swallowed by the small alligator wore band number 34-551995. All of the ducks were swallowed whole, feathers and all. This is the first time in all my duck-banding experiences that I have ever taken alligators in a duck-trap, probably because my traps for migratory wild fowl are not set until the middle or latter part of October each year, and at that time of the year alligators have ceased feeding and have either gone to their winter dens or are preparing to den up for the winter. Normally alligators take no food from early October until late March, during which time they hibernate. So, generally speaking, they are not a menace to migratory wildfowl.

On Saturday, September 18, 1936, as there were quite a number of ducks in pond No. 3, I had prepared and set a large trap which I have in that pond for catching birds for banding. In this trap I annually take a great number of migratory wildfowl. The birds using this pond at this time are principally Blue-winged Teals, Pintails and Gadwalls (*Chaulelasmus streperus*). This trap has in it a decoy pen, six feet by eight, in which I had placed ten of the domestic Mallards

usually known as the English call duck, which are commonly used for decoys. These ducks are smaller than the wild Mallard (*Anas p. platyrhynchos*) and considerably more noisy. The trap was set in the afternoon of the 18th and visited the morning of the 19th.

Sometime during the night an alligator, which must have been a very large one, went into the trap through the "V" (the "V" being two lines of wire extending from an opening eight feet wide in the side of the trap, ten feet inside, and having an opening only one foot wide into the trap), completely destroyed the decoy pen, which was built of new two-inch mesh poultry wire and covered, and ate six of the English call ducks, and killed two others. It then tore a hole fully six feet long through the two-inch poultry-netting in the side of the trap, escaping in this way. As there was water in the trap and all around it, there was nothing by which the size of the alligator could be judged, but from the strength exhibited it must have been a large, heavy one, probably ten feet or more in length.

In all my duck-banding experience, these are the only two instances in which alligators have ever interfered with my trapping.—Edward A. McIlhenny, Avery Island, Louisiana.

A Correction

In an article which appeared in the last issue of *Bird-Banding* (Vol. VII, No. 4) on page 163 the second line of the fourth paragraph should read: "which has *not* been authentically reported from mammals."

Carlton M. Herman

RECENT LITERATURE

(Reviews by Margaret M. Nice and Thomas T. McCabe)

The articles have been selected and arranged under subjects of importance to students of the living bird, and also for the purpose of suggesting problems, or aspects of problems, to those banders who wish to make the most of their unique opportunities.

Headings in quotation marks are the exact titles of articles or literal translations of such titles. Except in the case of books, which are always reviewed under their titles, headings not in quotation marks refer to general subjects, or are abbreviated from titles in foreign languages. References to periodicals are given in italics. Reviews by Mr. McCabe are signed with his initials.

BANDING AND MIGRATION

Banding in North America.[1]—On June 30, 1936, the list of coöperators numbered 2077, while the number of birds banded during the previous twelve months reached 274,695, making a grand total since 1920 of 2,181,150. The ten species that were banded in greatest numbers during the year were: Common Tern (*Sterna hirundo*) 23,429; Herring Gull (*Larus argentatus*) 19,298; Junco (*Junco hyemalis and oreganus*) 18,054; White-throated Sparrow (*Zonotrichia albicollis*) 15,344; Mallard (*Anas platyrhynchos*) 14,526; Chimney Swift (*Chætura pelagica*) 14,432; Pintail (*Dafila acuta*) 11,894; Starling (*Sturnus vulgaris*) 9,891; Robin (*Turdus migratorius*) 6,912; Song Sparrow (*Melospiza melodia*) 6,670.

Longevity records are: Mallard twelve and a half years; Black Duck (*Anas rubripes*) 10; Herring Gull 11; Crow (*Corvus brachyrhynchos*) 11; Blue Jay (*Cyanocitta cristata*) ten and a half; and Chimney Swift 9 years. A Pintail was banded in California March 6, 1935, and shipped to Hawaii; it was shot in California, December 4, 1935.

Banding in Belgium.[2]—In 1935, 628 recoveries of birds ringed in Belgium were reported. Bramblings (*Fringilla montifringilla*) sometimes winter in the

same locality, but one ringed in Belgium December 16, 1933, was taken in the Haute-Loire, France, November 11, 1935, between 600 and 700 km. to the south. An adult House Sparrow (*Passer domesticus*) was found 8 months after ringing 14 km. distant. Two birds ringed in September were released 10 km. to the south; one was found 3–4 km. east of the place of releasing 51 days later, and the other 2–3 km. west 3 months later. One bird reached the age of 4 years and 3 months.

Banding in Czecho-Slovakia.[3]—In 1934, 5445 birds of 120 species were ringed, and in 1935, 4489 of 116 species. A Lapwing (*Vanellus vanellus*) nearly 10 years old was reported.

"Results of the Removal of East Baltic Starlings into the Interior."[4]—Three thousand and thirteen migrating *Sturnus vulgaris* captured from June 21 to August 15, 1934, in East Prussia were transported to Saxony and Silesia and there released. Recoveries came for the most part from the winter quarters of the Saxon and Silesian Starlings rather than from those of the Baltic birds. One individual was found the following breeding season in the place where it had been released.

"The Invasion of Siberian Nutcrackers (*Nucifraga caryocatactes macrorhynchus*) **in 1933."**[5]—One wonders why, along the North-Temperate parts of two such equi-latitudinal continents, Eurasia *seems*, at least, more commonly characterized by nonperiodic large-scale movements of northern birds, on wide fronts and to great depths. Movements like those of the Crossbills and Nutcrackers are phenomena of so different an order from our local movements of Snowy and Horned Owls and Evening Grosbeaks that it is permissible to wonder whether post-Pleistocene settlements and migratory habits are not, in general, less fixed than in the Nearctic. It would be hard to improve upon this treatment of the last, relatively small, invasion of Siberian Nutcrackers, which swept from east to west across north and central Germany at a measurable rate in September and October, 1933, to withdraw once more in a less orderly or less well-observed sequence by April, 1934. The far greater invasion of 1911 was some three weeks earlier in arrival, presumably the effect of a nearer source, for the evidence is good that the 1911 movement had its origin in south-eastern Siberia, while that of 1933 came from the more distant northeast. Many minor movements, involving either the Siberian or the European (alpine) races, with rarely a suggestion of both, occurred in the intervening years, sometimes only perceptible in eastern Russia. The *Dünnschnabel*, or Siberian, race were known to occur in Germany in winter fifteen times between 1896 and 1933. The Siberian, more than the European, race is known to depend to some extent on cones, mainly of *Pinus cembra sibirica* and *Pinus pumila*, and the present and previous studies clinch the correlation of the invasions with bad crops, ultimately attributable to climatic factors. The last paragraph deals speculatively with possible effects on distribution, though no definite instances of stragglers can be shown.—T. T. McC.

[1] *Bird-Banding Notes.* 1936. 2, No. 14:219–245. Washington, D. C.
[2] Dupond, Ch. 1936. Œuvre du Baguage des Oiseaux en Belgigue. Exercise 1935. *Le Gerfaut*, 26:69–125.
[3] Richter, Karl. 1936. 21. Bericht über die Tätigkeit der ornithologischen Station "Lotos" in Bohm.-Leipa (vormals Liboch a.d. Elbe) für die Jahre 1934 und 1935. *Lotos* 1936:1–16.
[4] Krätzig, H. und E. Schüz. 1936. Ergebnis der Versetzung ostbaltischer Stare ins Binnenland *Der Vogelzug*, 7:163–175.
[5] Heidemann, J. and Schüz, E. 1936. Der Massenzug des Sibirischen Tannenhähers (*Nudifraga caryocatactes macrorhynchus*) im Jahre 1933. *Mitteilungen über die Vogelwelt*, 3:37–44.

HOMING

"Further Notes on Orielton Decoy, 1935-36."—C. W. Mackworth-Praed and H. A. Gilbert, 1936. *British Birds*, 30:159–161. A Moor-hen (*Gallinula chloropus*) returned from a distance of 15 miles, and a Coot (*Fulica a. atra*) from 25 miles.

For other items on homing see Nos. 1, 2, and 4.

LONGEVITY

"Recovery of Marked Birds." 1936.—*British Birds*, 30:125–130. A Teal (*Anas c. crecca*) at least 11 years old is recorded as well as a Redshank (*Tringa t. totanus*) and a Black-headed Gull (*Larus ridibundus*) almost 9 years old.

For other records see Nos. 1, 2, 3, and 6.

LIFE-HISTORY

"A Study of the Nesting Habits of the Ring-necked Pheasant in Northwest Iowa."—F. N. Hamerstrom, Jr., 1936. *Iowa State College Journal of Science*, 10:173–203. Of 445 nests of *Phasianus colchicus torquatus*, 76.9 per cent were unsuccessful. Man was responsible for 52 per cent of the failures, predators 19 per cent, and flooding 6 per cent. Crows destroyed only 6 per cent of the total number. Of well-concealed nests, 29 per cent hatched; while of fairly and poorly concealed nests, 22–26 per cent. The average clutch in 1933 was 12.3 eggs; in 1934, 10.1, and in 1935, 12.4; the author does not offer any explanation for the smaller number in 1934. The size of set decreased with the advance of the season. Fertility averaged 93 per cent.

"Hawking with the Eagle in Turkestan."[6]—A popular sport at the present day, the Golden Eagle (*Aquila chrysaëtos intermedia*) being used for hunting wolves and foxes. The men show much affection for their birds, valuing them as high as their best horses. A good Eagle can serve twelve, fifteen, sometimes twenty years, which, according to the "Encyclopædia Britannica," is what may be expected of Peregrines. The article is illustrated with fine photographs.

"The Bustard in Queensland."—F. L. Berney. 1936. *Emu*, 36:4–9 Fragmentary general information on habits, especially display and "roaring," as well as on the widespread destruction, by men in automobiles and by the imported foxes, which has brought *Eupodotis australis* into the danger zone.—T. T. McC.

"Some Observations on the Nesting of the Lesser Spotted Woodpecker."[7]—Detailed notes on a nesting pair of *Dryobates minor hortorum*. The male did the major part of the excavating, and, as in many other species of Woodpeckers, incubated at night as well as most of the day, the female relieving him twice during 10 hours for 70 and 95 minutes at a stretch. The male left the eggs at intervals of 2 to 73 minutes (averaging 18 minutes), staying off from 1 to 11 minutes (averaging 5 minutes); during 11 hours he spent 79 per cent of the time on the nest.

"Report on the Swallow Inquiry, 1935."—A W. Boyd. 1936. *British Birds*. 30:98–116. *Hirundo r. rustica* lays larger sets in the Lowlands of Scotland and northern England than in the southern half of England. "This suggests an association between longer hours of daylight and larger broods," although "actual hours of sunshine do not seem to have the same effect." The averages for the two regions are not given. Only 10 per cent of the eggs in 118 nests in 1934 and 117 nests in 1935 failed to produce young—a very high percentage of success. "A few pairs raise three broods in the season and the young of the last brood may occasionaly be found in the nest till late in October." The average brood in Great Britain is a little over four birds. The results in 1935 are closely similar to those in 1934. A fine example of coöperative ornithology.

"Some notes on Hypotaendia philipensis."—P. A. Gilbert. 1936. *Emu*, 36:10–13. Short but rather substantial information on the nesting and the incubation period of the Banded Landrail, of which the race observed was *H. p. australis* in eastern New South Wales.—T. T. McC.

"The Daily Activity of Wintering Long-tailed Tits (*Ægithalos c. caudatus*)."[8]—A charming account of observations on a flock of nine of these

Titmice from November 25th to March 6th. This species flocks by itself, not associating with other Titmice. At bedtime two perched side by side on a twig, a third came and pushed between, then all the others followed suit, till the original two were on the ends of the row. They always chose the same twig, until the end of December, when they found a more protected spot. Their roosting-time was closely correlated with light; on clear evenings they came 15 minutes after sunset; on cloudy ones 11 minutes before sunset. In one day they flew a distance of 3 km. from their sleeping-place. No particular bird acted as leader of the flock.

"Ménage a Trois in the Mute Swan."—J. M. Dewar. 1936. *British Birds*, 30:178–179. Six examples are given from the literature where one male *Cygnus olor* had two mates at the same time. In the present case a male in Edinburgh has had two mates for several years; he shares incubation with one of his mates, but ignores the other, although her nest is within a few yards.

"The Courting of the Bosun Birds."—Norman Chaffer. 1936. *Emu*, 36:38–39. This brief description of the flight courtship, off the cliffs of Malabar Head on Lord Howe Island, of the Red-tailed Tropic Bird (*Phaëthon rubricauda*) may well be the only record of a great display. While one bird floats on outspread wings the other hangs above it with body held vertical by rapid wing-beats and with the amazing tail-plumes erected and switched from side to side. The reviewer was interested to find that Matthews quotes Hull's enthusiastic description of the same birds at the same time of year, on the same island, and at the same or similar sea-cliffs, which does not mention such behavior.—T. T. Mc.

Polygamy in the Pied Flycatcher.[9]—Two female *Muscicapa h. hypoleuca* sat on eleven eggs in one nest in Germany; later three adults fed the nine young.

Unmated Thrush-Nightingale Again Nesting.[10]—An unmated female *Luscinia luscinia* again nested close to the house of the Vogelwarte in Pommerania, incubating her five eggs for weeks before deserting. Interestingly enough, each evening this bird sang a brief song.

"The Egg-Breaking Habit of the Kingfisher."—Robert L. Brown. 1936. *Scottish Naturalist*. No. 221:135–138. A brief and most irritating paper which fails to make use of abundant material on an important subject. We seem to be expected to understand that *Alcedo atthis ispida* makes a practice of entering neighboring nest-holes of the same species and deliberately breaking and carrying out the eggs, which would be a very interesting habit, especially in a bird whose numbers are necessarily much limited by a narrowly limited environment. But the whole account is so vague and so overlaid with discussions of various other incidents, accidents, and fatalities to clutches and broods, that it is impossible to tell what the author believes the situation to be. At any rate we have the case of a bird which is more or less regularly three-brooded but which hardly ever brings off all three, and very rarely two.—T. T. McC.

[6] Dementiev, Georges. 1936. Le Vol à l'Aigle au Turkestan. *L'Oiseau et la Rev. franc. d'Ornith.* 6:361–365.

[7] Schuster, L. 1936. Einige Bemerkungen zum Brutgeschäft des Kleinspechts. *Beiträge zur Fortpflanzungsbiologie der Vögel*, 12:221–225.

[8] Paechnatz, Hermann. 1936. Aus dem Tageslauf über-winternder Schwanzmeisen (*Ægithalos c. caudatus*). *Der Vogelzug*, 7:175–179.

[9] Pollkläsener, Georg. 1936. Beobachtungen beim Trauerfliegenschnäpper. *Beiträge zur Fortpflanzungsbiologie der Vögel*, 12:210.

[10] Robien, P. 1936. Brutstudien an pommerschen Vögeln. *Ornithologische Monatsberichte*, 44:153–156.

BIRD BEHAVIOR

"Courtship of the Little Stint (*Calidris minuta*)".[11]—The fall courtship activities of a flock of young Little Stints in the Königsberg zoo are described and a long discussion of bird courtship in general follows. The author believes that "lower forms" have "mutual courtship," while in "higher forms" the sexes have different roles. The article is difficult reading with involved sentences and

forty-two footnotes, some of them a half-page in length. The author fails to mention the most significant contribution in this field, Lorenz's "Kumpan" (*Journal für Ornithologie*, 1935; reviewed in *Bird-Banding*, July and October, 1935).

"Bird Courtship."—H. N. Southern. 1936. *Natural History*, 38:349–352. The courtship of the Great Skua or Bonxie (*Catharacta skua*) has been described as "mutual," but the author by watching from a blind in the Shetlands found out that the male "puffed out his neck feathers until they looked twice the normal thickness, and strutted with head in the air in front of the female," which played a comparatively passive role.

Sociology of a Herring Gull Colony.[12]—A fuller account of the social behavior of *Larus argentatus* than that given in *Beiträge zur Fortpflanzungsbiologie der Vögel* in May, 1936 (see *Bird-Banding*, July, 1936). Interesting new material is given on methods of territory establishment. If a new Gull comes on to the territory, the owner assumes the "threat-attitude" and walks slowly towards him as if he were exercising great self-control not to fly at him. If the intruder leaves, the owner stretches out his wings for several seconds—"a proud picture of might." But if the other answers him in the same attitude, then the first crouches down and makes a scrape and the other does likewise, the two sitting opposite each other. They pick up material, rise, try to get the material from each other's beaks, then try to get hold of wing or beak and start to fight.

Birds in immature plumage may pair, nest and copulate, but fail to lay eggs.

"The Winter Behaviour of Moor-Hens."—Averil Morley. 1936. *British Birds*, 30:120–124. An interesting account of territorial and courtship behavior in *Gallinula ch. chloropus* in Sussex. In early October there was one pair (A and B) on a small pond; on the 17th "there appeared a young bird (C), easily distinguished by its almost dwarfish size, which began to pester A and B." On October 21st the first courtship activities were seen. "C, as it swam towards A, calling the 'Coot-cry', rapidly pecked the water." On this day another young bird (D) arrived, and in early November lured B away from A—presumably the male of the pair. "In this month (November) A, now quite alone, made distressed attempts to get back B, which had paired off with D. It would swim across the pond to the stream-mouth by C's beat, clucking anxiously," but its efforts were in vain. "At the end of November A disappeared, and C became the tyrant of the place, claiming the stream-mouth as its beat and confining B and D pair to the pond; it was a most irascible little bird and would chivvy and chase the pair over the pond and follow them in flight across the rush-bed if they ventured too near its haunt." In winter the birds were seldom on the pond. "From March 22d, however, the Moor-hens appeared again on the water, but the fighting was much fiercer and more intense because B and D were come for the purposes of nest-building and strongly resented the presence of the other birds. Bobbing and water splashing were only performed by unmated birds, one of which was strangely enough C." One interesting item here is that the smallest bird was the tyrant.

"The Courtship Display of the Flightless Cormorant."—M. Davis and H. Friedmann. 1936. *Scientific Monthly*; 42:560–563. Description and sketches of courting display of a pair of *Nannopterum harrisi* in an outside cage in the zoo at Washington, D. C.; at one stage the birds entwine necks.

"Analytical Studies of Group Behavior in Birds."—W. C. Allee. 1936. *Wilson Bulletin*, 48:145–151. Good résumé of the subject with a brief bibliography of fourteen titles. "The social order among chickens . . . is of the relatively firmly fixed, despotic sort originally described by Schjelderup-Ebbe." "In pigeons, shell parrakeets, ring doves, and canaries, the social order, while distinctly recognizable, is less firmly fixed; subordinate individuals normally 'win' a minority of their pair contacts." The first social hierarchy is based "on an almost absolute peck-right," the second on "what may be called peck-dominance."

"In shell parakeets the two sexes are closely similar in coloration and size." The female *Melopsittacus undulatus* is "distinctly dominant except during the breeding season when the dominance shifts to the other sex."

Territory and Courtship in Lizards.—Very interesting work has been done by L. T. Evans on the American chameleon (*Anolis carolinensis*). In males the "urge to acquire and to hold a certain restricted territory is very marked. The resident male (that has been in a particular cage for twenty-four hours or more) wins in 91 per cent of the combats, not only because he is heavier than the non-resident (42 per cent of such combats being won by lighter males) but also because he fights harder to defend territory than the non-resident does to acquire it." "The fighting pattern consists of eight reflexes," the first four producing "what might be called an intimidating mechanism which has apparently evolved to cause the males to appear as large and imposing as possible to each other. As a bluffing device it is certainly successful since many encounters end at this point in the fighting pattern."[15]

"Those living reptiles which are undoubtedly vocal are either crepuscular or nocturnal (the geckos) or live in muddy jungle rivers where vision is equally obscured (the crocodilia)." They lack the "special structures, such as neck-frills, crests, dewlaps or bright colors, which diurnal reptiles frequently use as a means of visual intimidation of rivals," but exhibit great "propensity of rivals to fight viciously, often mutilating or killing one another."[14]

Male *Anolis carolinensis* distinguished males from females and also between different males.[13] The normal female rarely fights, but castrated females do; with males castration seems to have no effect on pugnacity.[16]

As to courtship behavior, "Observations made in the present study suggest that the mere flight of the female from the performing male quite probably signifies acceptance of the male and is therefore a very definite part of the complete courtship pattern and should be considered as an important phase of the mating instinct."[13]

[11] Christoleit, E. 1936. Zur Balz des Zwergstrandlaufers (*Calidris minuta*). *Beiträge zur Fortpflanzungsbiologie der Vögel*, 12:177–187; 239–251.

[12] Tinbergen, N. 1936. Waarnemingen en Proeven over de Sociologie van een Zilbermeeuwenkolonie. *De Levende Natuur*: 1–24.

[13] Winter Mating and Fighting Behavior of *Anolis carolinensis* as Induced by Pituitary Injections. 1935. *Copeia*, No. 1, April 10:3–6.

[14] The Development of the Cochlea in the Gecko, with Special Reference to the Cochlea-Lagena Ratio and its Bearing on Vocality and Social Behavior. 1936. *Anatomical Record*; 64(2), and Sup. 2:187–201.

[15] A Study of a Social Hierarchy in the Lizard *Anolis carolinensis*. 1936. *Jour. Genetic Psychology*, 48:88–111.

[16] Behavior of Castrated Lizards. 1936. *Jour. Genetic Psychology*, 48:217–221.

ECOLOGY

"The Cycles that Cause the Present Drought."—H. P. Gillette. August, 1935. *Water Works and Sewerage*. A concise statement filled with impressive figures and followed by a bibliography of twenty titles; it gives us no hope for a speedy return to "normal" rainfall. "The main cause of the present drought is a cycle of 152 years," but another cycle of 70 years has assisted this major cycle in bringing on the drought "and will continue to assist it for many years." "Peaks of shorter cycles will effect relief from the drought, but only for short periods. Hence it will be a waste of public funds to plant the proposed shelter belt of trees from Canada to Texas. The seedlings will never reach maturity. . . . We are in the middle of one of those long dry periods so often mentioned in history, which in olden times caused famines, migrations and wars. Averaged by decades, rainfall in general will be subnormal for about 40 years."

The Food of Australian Birds with Reference to Protective Adaptation in Insects."—Keith C. McKeown. 1936. *Emu*. 36:21–30. McKeown's list of insects, formicids, myriapods, etc., believed to possess protective adaptations (coloration, odor, secretions, weapons), together with the birds known to feed

upon them, suggests to the author the conclusion that certain forms, notably the Robins and their near allies, specialize upon organisms so protected. Whether, as a corollary, we are to understand that the number of other kinds of birds preying on such insects is smaller than would be the case for an equal number of unprotected insects, remains doubtful. The author does not say so, though such a conclusion seems called for by the opening pages which constitute one more highly theoretical attack on McAtee's "So-called Protective Adaptations" (*Smiths. Misc. Colls.*, 85:1–201, 1932).—T. T. McC.

"Fluctuations in Numbers of Ruffed Grouse, *Bonasa umbellus* (Linné), with special reference to Ontario."—C. H. D. Clarke. 1936. Univ. of Toronto Studies, Biological Ser. No. 41:1–118. A study based on censuses, questionnaires, and the examination of 162 specimens. The cycle of this species is about ten years. "Meteorological and astronomical conditions, such as sunspots, are not considered to be the causes." Disease is the "immediate cause of the periodic dying-off of grouse," a blood protozoan, *Leucocytozoon bonasae*, being responsible for heavy mortality of young birds. The Ruffed Grouse is territorial and is believed to be usually monogamous

"The Relation of Field Characters to the Question of Species and Subspecies."—A. A. Saunders. 1936. *The Auk*, 53:283–287. Attention is called to cases (Thrushes, Flycatchers) where nesting-habits, call-notes, and song are far more distinctive than plumage, and to other cases (Red-shafted and Yellow-shafted Flickers, Golden-winged and Blue-winged Warblers), where with somewhat different coloring, yet similar habits and voices, the birds readily hybridize. The author suggests the latter are geographical forms of the same species. Differences "in breeding habitat and nesting habit are more important in keeping related species apart than differences in plumage and song." "The instinct to choose a habitat probably has more to do with the abundance of a particular species than any other factor. If a bird breeds in a variety of habitats, like the Robin, it is common."

For an important book on ecology see the review of "Deserts on the March."

CENSUSES

"Frequency of Occurrence of Summer Birds in Northern Michigan."—J. Linsdale. 1936. *Wilson Bulletin*, 48:158–163. Analyses of bird populations of localities in Michigan, Kansas, and California according to Raunkiaer's Law of Frequence. The author shows how records of birds observed in restricted localities may be summarized so as to be of scientific value. He points out that the species of "low frequence may be among the most important in the make-up of the wild animal population" and are apt to "contribute most to the attractiveness of wilderness areas and the outdoors in general for the person who watches birds. It is the natural proportions between species, as revealed by analyses of populations, that we should strive to maintain in our conservational activities." The unfortunate result of "the ordinary kind of human occupation of land is to remove the species of low frequence or to lower their frequency of occurrence and to increase the frequency of occurrence of a few species, usually ones already common."

"Report on Great Crested Grebe Sample Count, 1935."—P. A. D. Hollom. 1936. *British Birds*, 30:138–158. A sample count of slightly less than half the population of *Podiceps c. cristatus* in Great Britain showed 1300 birds, an increase of 3 per cent over the complete census of 1931. Breeding pairs decreased 6 per cent, while non-breeders increased. Regions with smaller populations were those that had been most affected by the drought. This census is one of the admirable projects of the British Trust for Ornithology.

"A Winter Bird Community in Western New York."—W. C. Van Deventer. 1936. *Ecology*, 17:491–499. The average number of each of four species

met per trip on forty acres was: Downy Woodpecker (*Dryobates pubescens*) 2.33; Chickadee (*Penthestes atricapillus*) 8, White-breasted Nuthatch (*Sitta carolinensis*) 2.12, and Tree Sparrow (*Spizella arborea*) 14, or 26.5 birds in all; this gives a population of 423 birds per square mile. Two or more species were found associated on 31 per cent of the occasions, which is "six times the amount of association which would occur through the operation of chance."

EXPERIMENTS ON THE EFFECTS OF LIGHT

"The Effect of Controlled Illumination on the Reproductive Activities of Birds."—William Rowan. 1936. *Kongressbericht* Band I, VI. Weltgeflügelkongress 1936. Pp. 142–152. A summary of the author's pioneer experiments and a discussion of Bissonnette's work. In mentioning the contrary results obtained by the latter with Starlings from his own with Juncos in the matter of increased periods of exercise, the author says, "Bissonnette's contrary results on a different species actually disproved nothing." Dr. Rowan is repeating these experiments on this unsettled point this winter.

"Sexual Photoperiodicity."—T. H. Bissonnette. 1936. *Jour. of Heredity*, 27:171–180. An interesting résumé of the subject, mentioning some of the chief results of experimental work with varying quantities and qualities of light on sexual activity in plants, mammals, and birds, and giving a bibliography of ninety-nine titles. The author suggests "that the stimulus of added length of day, acting through the eyes and optic nerves, stimulates the anterior hypophysis. . . . Possibly migration in birds may be directly related to the cycles of the anterior hypophysis, as well as (or rather, *instead of*) to the state of activity of the sex-glands, as a part of the urge toward spring mating of migratory birds, or of the reaction from mating in the autumn."

CONSERVATION

"The Empoverishment of Faunas."[17]—The author deplores the relentless persecution of Raptors, both diurnal and nocturnal, in Europe. At the Congress of London in 1905 W. Rothschild gave a list of 139 species of birds completely exterminated and of 98 that were disappearing. Forty-six had been destroyed by natural causes, and 191 by man and his domestic animals.

"The Shortage of Waterfowl."—E. D. Lumley. 1936. 2d Ed. Teaching Unit 1; Emergency Conservation Com. Pub. 58. 17 p. An excellent statement of the perilous situation of our waterfowl.

"Finishing the Mammals."—R. Edge. 1936. Emergency Conservation Com. Pub. 59. 24 p. A stirring appeal to call a halt in the wanton destruction of our wild life.

"Excluding Birds from Reservoirs and Fish ponds."—W. L. McAtee. 1936. U. S. Biol. Surv. Leaflet 120:1–6. Methods of wiring reservoirs and hatchery ponds "at moderate cost, in some cases for less than the cost of patrolling property and killing the birds."

[17] Madon, P. 1936. De l'Appauvrissement des Faunes. *L'Alauda*, Ser. III, 8:194–197.

BOOKS

More Songs of Wild Birds.—Albert R. Brand. 1936. New York. Nelson. 116 pp. $2.50. The credit of the pioneer work in the recording of bird voices belongs to Mr. Brand, who in 1934 brought out "Songs of Wild Birds" (Nelson) with records of thirty-five species. The first book describes the technique of recording and gives a brief bibliography of American and foreign titles. The present one has an excellent treatment of "the significance of bird song," showing a good acquaintance with the work done in this country and abroad. Half of the book is devoted to descriptions of the forty-three birds whose voices are

reproduced; range, field characteristics, dates when song is abundant, usual location when heard, calls and songs, are all skilfully treated, each species being illustrated by a sketch by George Sutton. The records themselves are very good. It is fascinating to listen to the one entitled "A Spring Morning on a Woodland Pond," and one only regrets that the spring peepers were not given more space. The Chuck-will's-widow, like the Whip-poor-will of the earlier records, is perfect; the Mourning Dove and the Killdeer very fine, while the honking of a great flock of Canada Geese is nothing short of magnificent.

Songs of Wild Birds.—E. M. Nicholson and Ludwig Koch. 1936. London. Witherby. 216 pp. 15 shillings. This book, with the same title as the 1934 volume of Mr. Brand's, is distinctly British, no mention being made of the important work that has been done on the subject in America and Germany. There are many good things in it—the Chart of Bird Song, the chapter by Koch on how he got the songs, the descriptions of songs of different species, and a suggestive "Preliminary Classification of British Bird Songs." The main chapters, however, on "What is Bird-Song?" and "Why do Birds Sing?" are a disappointment, coming from the author of "How Birds Live"; they do not give a clear, well-organized presentation of the subject. Frieling and Christoleit (See *Bird-Banding*, April, 1936, p. 94) in Germany deplore the deterioration of bird song in centers of population, attributing it to the lessened need for territory-defense due to augmented food in gardens and parks. Nicholson, on the contrary, says that the increase in food, warmth, and nest-sites brings "plenty of birds of the same species into close contact, often in an unusually well-fed condition and with plenty of time on their hands, a state in which they are—as centuries of keeping caged birds have shown—likely to sing against one another and to develop both a longer song-period and a more advanced song." Even "their high losses through nest robbery and destruction . . . help to compel them to sing." "In such ways, without intending or knowing it, we have made our English gardens the scene of an extraordinary flow of bird-song, which continues during seasons of the year when woods and fields are nearly silent, and which swells in spring to a torrent of sound."

The records of 15 species are excellent; one is devoted largely to the Nightingale, while the songs of the Turtle Dove, Wood Pigeon, and Chaffinch are especially good.

Bird Migration. A Short Account.—A. Landsborough Thomson. London. Witherby. 224 pp. 5 shillings. An admirable concise treatment by the foremost living authority on the subject. It is an achievement of high rank to have condensed into brief and readable form this tremendous subject and to have made a fascinating book as a result. This "short account" can be heartily recommended to all bird-students, beginners and seasoned ornithologists alike.

Green Laurels: The Lives and Achievements of the Great Naturalists. Donald C. Peattie. 1936. New York. Simon and Schuster. 368 pp. $3.75. This gay and fascinating tale of the great naturalists will reach a large audience who never would open a less alluring history of science. With its pictures of the times and the emphasis on many little-known men, its index and bibliography, it is well worth reading by scientists also. Mr. Peattie has a flair for dramatic values and a gift of expression that at times reaches great beauty. If, in addition to his facility in writing, he would inform himself more thoroughly of what present-day naturalists are doing, he would be a great power for good in educating the public to an awareness of nature.

Deserts on the March. Paul B. Sears. 1935. 2d printing, Norman, Oklahoma. Univ. of Oklahoma Press. 231 pp. $2.50. A compelling picture of "Man, Maker of Wilderness"—in China, India, Europe, and—bigger and better—America. "The story on the older continents has been a matter of millennia. . . . In North America it has been a matter of not more than three centuries

at most—generally a matter of decades." "Bare ground left by the plow will have as much soil washed off in ten years as the unbroken prairie will lose in four thousand," (page 3).

Man "is the first example of a single species to become predominant over the rest" (page 193). And what has been the result? "Soil has been exhausted or depleted, forests and grasslands destroyed, topography injured, and conditions produced which facilitate the activities of these pests which compete with man for survival" (page 194).

After describing the horrors of the dust-storms, Professor Sears says: "With the turf gone and the cycle of moisture past its peak, with the winds maintaining their normal behavior, the country literally started to blow out of the ground. For this great catastrophe the individuals directly responsible have paid in bitter coin, and we shall all have to pay in a measure. No work of ignorance or malice is this, but the inevitable result of a system which has ever encouraged immediate efficiency without regard to ultimate consequences" (page 168).

The great seriousness of the situation is clearly set forth. The only hope for the future is in the application of the findings of biology and ecology. For this there must be generous governmental and institutional support. Moreover, the scientist must educate the public.

"His findings once made belong to the world, and his is the charge to make them known. Perhaps if the scientist were given, not less of technical training, but a great deal more of liberal training than he usually gets, it would make him more directly useful to the rest of us than he frequently is. Effective publication, no less than investigation, is an obligation which rests upon the man of science" (page 26).

Professor Sears is doing his part in writing in vivid, readable style this important book on the most vital question confronting mankind. It is deserving of the widest circulation.

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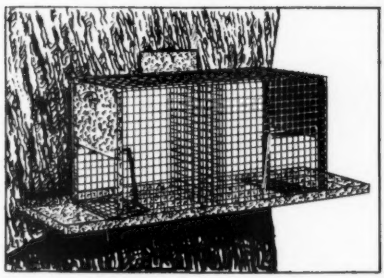

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